RAILROAD GAZETTE

FRIDAY, FEBRUARY 8.

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Contributions.

Plate Planer for Bridge Work.

PENCOYD IRON WORKS, PHILADELPHIA, Feb. 4, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to the cut of a large plate planer being built by Bement, Miles & Co., illustrated in your last issue, we would say that it is being built for the Pencoyd Bridge & Construction Co., for the purpose of planing edges of sheared steel plates for bridge work. It is, so far as we know, the largest plate planer which has yet been built in this country, and opens up a rather new field in bridge work, so far as American practice is concerned. A. & P. ROBERTS & CO.

English and American Railroads Compared in Operating Expenses.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In reviewing in your valued journal of the 14th ult. my last paper read Dec. 5, before the American Society of Civil Engineers, entitled "English and American Railroads Compared in Operating Expenses," you say, "there are two points in which some part of Mr. Dorsey's reasoning is open to possible criticism. The first is the assumption that the percentage of expenses to earnings is the same in freight and passenger business. * * * The other point is a more troublesome one. It relates to the accuracy of the whole set of English ton-mileage and train-load figures used by Mr. Dorsey."

Table 51 of my book, "English and American Railroads Compared," shows how uniform the cost of transporting one ton or one passenger one mile is on the English railroads. Table 25 shows that the relative proportion of the ton and passenger mileage varies, there being three times the ton mileage to the passenger mileage in some instances, and three times the passenger mileage to the ton mileage in others. Of course it would be much better if we could get the official figures, but as these cannot be had we must do the best we can in their absence. For purpose of comparison it is safe to estimate that the cost of transporting one mile one ton or one passenger is about the same on the English railroads.

In regard to your second point, I have during the last five years tried every possible way to get at the average charge per ton per mile. I have asked the opinion of every railroad official and shipper that I have met, and *none* have said that my estimated average of 1d. per ton per mile was too high. I have seen letters from prominent railroad officials criticising my papers and book, and they have made no allusion to this point, which they certainly would have done if they had thought it wrong. The evidence supporting this rate is given on pages 109 and 110 of my book. While I see no reason to admit that the rate I had stated is too high, I will, for the argument's sake, assume that the rate you name, viz., 0.9 penny per ton per mile, is the proper unit instead of one penny as given by me. On this basis and at this rate the following table has been calculated. In form it is similar to the table you have criticised, except that it is, for brevity, confined to only one English road—the London & Northwestern:

Even at the reduced figures you have named, this table shows that the American roads are operated at much less cost than the English roads.

For example paragraph 10 shows that after deducting all "traffic expenses, coaching and merchandise" from all operating expenses on the London & Northwestern, and deducting nothing from the total operating expenses of the Pennsylvania and Knoxville roads, the cost of transporting one ton one mile on the English road is much greater, being respectively 42 and 20 per cent. more than on the American roads named. And by deducting all traffic expenses from all roads, the difference in favor of the American roads is still greater, being respectively 118 and 76 per cent. This shows, even at your reduced estimates for the average freight charge, that the American roads are operated at a much less cost than the English road named. The result would still be the same even if the average charge should be only *one-half of the amount you estimate*, say $0.9 \div 2 = 0.45$ d. provided proper allowance be made for the difference in cost of fuel and wages paid in the two countries.

It does not require very deep or abstract calculations to convince any one who is open to conviction, that freight cannot be transported cheaply where the average freight trains are loaded only to the extent of 60 to 80 tons each of paying freight, and where the *dead weight transported is much greater than the paying load*, as is the case on English railroads.

EDWARD BATES DORSEY,
M. Am. Soc. C. E.

Care of H. L. HORTON & CO.,
Bartholomew House,
Bartholomew Lane, E. C.
LONDON, Jan. 25, 1889.

Sub-currents in the South Pass of the Mississippi.

PORT EADS, La., Jan. 27, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The physical features of the South Pass entrance of the Mississippi River, and the works that have been established there for maintaining a deep water harbor, have probably been more extensively discussed than those of any other port, yet with a low water stage of the river an interesting action of the river currents may be observed there, that, as far as I am aware, has not been mentioned in any of these discussions, and which, without doubt, plays an important part in causing sedimentary deposit in the Pass.

With a low stage of the river the mean velocity of current varies from nearly zero to one and one-half miles per hour, depending on the tide, and at high river it is about four miles per hour, yet vessels that have no trouble in steaming up stream at the latter stage of river are often unable to make any headway against the apparent slack water current during low river.

Tugs with one vessel in tow are at times unable to make the slightest headway for a considerable time, and then without any apparent change of circumstances are able to pass on with perfect ease.

The only surface indications of these sub-currents are slight ripples extending across the river similar to those produced by low reefs or obstructions in the bed of a stream. The phenomenon is most apparent with a falling tide, but is manifest to a lesser extent when tide is rising.

A careful study of the matter has lead me to the conclusion that this action is the resultant due to the river current and a salt water current flowing up stream on the river bed.

When the tide commences to ebb an impulse is given to the fresh water at the surface, which in turn reacts on the uneven surface of the salt water stratum at the bottom of the river, and piles it up in immense rolls extending across the entire channel, and creating a sort of salt water dam, over which the natural current flows, causing the ripple mentioned above. This overflow with the salt water current up stream beneath causes the dam to revolve around its horizontal axis and at the same time move down stream.

What the velocity of this rolling cylinder of salt water may be could only be determined by accurate observations with a direction current meter; but probably it is not sufficient to account for the inability of a strong tug to pull a vessel through the resisting medium.

A vessel on encountering the sub-current would have its bow in salt water and stern in fresh water, and as the salt water has three per cent. more buoyancy than river water, the efforts of the propelling power would be expended in lifting the vessel up an inclined plane as well as in overcoming the velocity of the current. With a rising tide a wedge of salt water is forced beneath the volume of river water until some unevenness of the bottom rolls up the edge and produces a dam similar to but less active than that developed by a falling tide.

GEO. Y. WISNER.

1887. £1 = $4.80. 1d. = 2 cents. All figures representing cost are in cents, except the average cost per mile of railway operated, which is in dollars.	Pennsylvania Railroad Division.	Knoxville Branch Louisville & Nashville System.	London & North Western.	Percentage against L. & N. W. and in favor.	
				Pennsylvania Division.	Knoxville Branch.
Average cost per mile of railroad operated, in dollars		$ 39.190	$ 255.888		
1.—Percentage of total tonnage mileage transported East	74	30			
2.—Percentage of total tonnage mileage transported West	26	70			
3.—Average tons in loads of freight trains	207	154	88	135	75
4.—Average charge for transporting one ton one mile, cents	.67	.90	1.8	169	100
5.—Percentage of operating expenses to earnings	63	58	52		
6.—Percentage of operating expenses to earnings on the Pennsylvania Railroad Division, provided it charged the same rates for freight as are charged on the English railroads, viz., .9d. = 1.8 cents per ton per mile	23			126	
7.—Percentage of increased earnings that the Pennsylvania Railroad Division would receive if it worked with their present operating expense and received the same freight rates (.9d. per ton per mile) as the English railroads now receive	463				
8.—Percentage of traffic expenses (coaching and merchandise) to total operating expenses	35	32	36		
9.—Average cost of transporting one ton one mile. The cost for the English railroad is found by multiplying the estimated charge of .9d. per ton per mile by the percentage of operating expenses to the gross earnings, as per paragraph 5 above; cents	.426	504	.94	121	87
10.—Average cost of transporting one ton one mile, deducting on the English railroads all "Traffic Expenses (coaching and merchandise)," and deducting nothing from the total operating expenses of the American railroads; cents	.426	504	.603	42	20
11.—Average cost of transporting one ton one mile, deducting all "Traffic Expenses" (coaching and merchandise) on all roads; cents	.277	.343	.603	118	76
12.—Average cost of train-mile—freight and passengers; cents	85.37	71.00	65.88		
13.—Equated cost of train-mile on the English railroads, provided they transported their present train loads at the same cost per ton per mile as is done by the American railroads, to which they are compared, in cents			Cost	37.49	44.35
			Per cent	75	49

Railroad Affairs in Michigan.

LANSING, Mich., Feb. 4, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The Michigan legislature convened in biennial session on Jan. 2. Its first important business after organization was to choose a United States Senator, and James McMillan, of Detroit, was elected. Mr. McMillan's election is received with favor as one likely to reflect credit upon the state. He is a railroad man of long experience, is largely interested in railroad and mining properties in the Upper Peninsula, and is President of the Duluth, South Shore & Atlantic. He is also President of the Michigan Car Company, among the most extensive establishments of its kind in the country, and also of a number of other large manufacturing concerns, and is a man of rare business and executive ability.

By an unusual coincidence Gen. W. D. Washburn of Minneapolis has also just been elected Senator from Minnesota. Gen. Washburn is president of the Minneapolis, St. Paul & Sault Ste. Marie, another of the trunk lines traversing our Upper Peninsula. That section of our State is thus placed on such ground that its material interests are not likely to be overlooked in Congress.

The railroad legislation of Michigan, while being conservative, is still kept abreast of the times. The Commissioner is charged with a general supervision and execution of railroad laws in the relation of the companies thereto, but is not authorized to meddle with traffic rates. The maximum figures for these are fixed by law and can only be altered by the legislature. Complaints of discrimination in traffic rates are seldom made or heard of.

Our laws require the use of automatic couplers, the blocking of frogs, interlocking and derailing switches at railroad crossings and the removal of stoves from passenger cars.

The police regulations for the government of the roads are exacting and well enforced by the companies, and there have been no strikes among railroad employés in this state for several years. Notwithstanding the situation seems to be about all that could be desired, every new legislature brings with it a flood of proposed measures offered by fresh members from the country districts, the most of which fortunately die in committee. The present legislature is no exception to the others. Among the first bills introduced was one to regulate charges for berths in sleeping cars and to prevent lowering the upper berths when not in use. It was forcibly sat down upon at the third reading and now reposes upon the table, where it will probably stay.

A bill has also been presented in the Senate amending the iron clad car heater law of 1887, so as to permit the presence of stoves in the cars under certain conditions, and giving the Railroad Commissioner a wider discretion in the premises. It will probably pass in a modified shape.

The singular accident upon the Chicago & North Western in the Upper Peninsula, resulting from the derailing of a car and its collision with a large stump near the track in the right of way, whereby Lieutenant Governor McDonald and two others were instantly killed and a number of persons injured has called out a bill requiring the companies to remove all such obstructions to a safe distance from the tracks.

The present method of taxation of railroad property in this state is a specific tax upon the gross receipts of the companies. The plan has worked well and fairly hitherto. Last year the total taxes were $716,000, equivalent to $126 upon a taxable income of $5,500 per mile of road. Notwithstanding this favorable outcome, a number of bills are being batched upon the subject; some to increase the rate of taxation, others to change the plan, prominent among the last, the adoption of local taxation. It does not seem likely that any of the measures will be adopted.

A bill to create a board of arbitration to settle differences

between railroad companies and employés seems to be regarded with favor.

A bill to reduce passenger fares to a uniform rate of two cents per mile will command a considerable support, and possibly may be adopted for the main lines of the Vanderbilt roads. It is hardly probable, however, as a close analysis of the traffic shows that the volume will not at present warrant such a reduction, and its effect would be to stop the building of new lines in the northern part of the state. The members from that region understand that, and are likely to be solid against the bill.

A bill to require the application of driver brakes and their use upon all mixed trains is the last to be introduced, and will doubtless have favorable consideration.

Our legislature has now adjourned until the 12th inst., to permit the several committees to inspect the state institutions. There will be twenty-four days remaining, after they reconvene, for the introduction of new bills, and doubtless the hopper will be filled to overflowing by the time the limitation shall expire. M.

Transportation of Baggage.

TO THE EDITOR OF THE RAILROAD GAZETTE:

General Alexander, in the January "Scribner," has one or two remarks upon possible changes in some of our transportation methods which may turn out to be prophetic. One is that the carriage of baggage should be considered a charge separate from the carriage of the passenger, with the possible result that tickets for travelers without trunks could be sold at less price than now, while the price for travelers with baggage would be no more than at present. Doubtless this is a rosy view to take, but it does not follow that it has not an element of truth. We all know that in Europe there is an extra charge for luggage. Probably the American custom of allowing so many pounds to each passenger arose from the circumstances surrounding traveling 50 years ago. Then few started from home without baggage; indeed, no one traveled without full consideration and elaborate preparations. But now the case is reversed. Practically, therefore, by continuing the ancient custom, we charge upon the unburdened traveler the expenses of carrying Saratoga trunks to the summer resorts. The old need of traveling always with impedimenta has passed away. Why, then, should the old double charge without discinction be retained? The only way to discuss this question profitably is through statistics, and for these we must call upon our general baggage agents and other officials familiar with the facts. By all means let us know just how much the carriage of baggage costs our railroads—actual outlay, I mean. Then let the result be stated by the 150 pounds and by the mile. Will not some one connected with these departments devote a few hours, now while traffic is light, to collecting figures bearing upon this subject and let them be given to your readers? This would lead to the further idea whether the carriage of baggage (supposing the charge separated) could not be done better and more cheaply by a separate company than by the railroad.

It has often been remarked lately that the Inter-state Commerce Law is a powerful incentive to consolidation. Admitting the truth of this we cannot see any prospect in the near future for the union of the stronger lines, of the New York Central with the Pennsylvania for example. Nevertheless we see signs of combination in minor things. Take parlor cars, for instance. Why should a railroad not build and run its own drawing-room cars and thus secure to itself the profit? Because experience has demonstrated that there is no profit in such individual cars. It is better to pay Pullman mileage, even, than to do it. Only a large system of parlor cars running over a great many roads can make a profit for itself and be of advantage to each railroad, too. So with express companies. Amalgamation into vast systems running over many roads is the only way to combine cheapness with profit. The Baltimore & Ohio is probably the last road which will start the experiment of running its own express and parlor cars. In the Erie report President King, speaking of the sale of the Erie express to Wells, Fargo & Co., says that 40 per cent. on the large traffic controlled by the large express company is better than the whole of the local.

Now if this be demonstrated in regard to express and other matters, why not in the carriage of baggage? A large and thoroughly organized system, perhaps including collecting and delivery by team, could unquestionably do the work better and with less aggregate expense to the railroads than the present plan. If a careful study of statistics should show that the saving would sustain Gen. Alexander's position—less fare to unencumbered travelers and about the same aggregate charge to those with baggage—the public would hail the improvement with delight. Of course, the point of the economy lies in the fact that such proposed baggage department would operate over a large number of roads and so reduce the expense to each individual one, leaving still, perhaps, a handsome profit to the managers. But first for the statistics of actual cost of transporting baggage upon one or more of our large roads. For these we must wait.

T. L. G.

The Interlocking System of the St. Louis Bridge and Tunnel Railroad.

BY N. W. EAYRS, C. E., ASST. SUP'T. OF STRUCTURE AND INTERLOCKING.

The St. Louis Bridge & Tunnel Railroad Co. is a corporation formed for the purpose of facilitating the transfer of freight and passengers across the Mississippi River at St. Louis. This corporation controls the St. Louis Bridge with its approaches, and the tunnel in St. Louis, which extends from Third street (the western terminus of the west bridge approach) to Clark avenue, a distance of nearly three-quarters of a mile. The mileage operated by this company consists of about 3½ miles of double-track main line, and about 28 miles of side tracks in its yards on both sides of the river.

The Bridge & Tunnel Co. does all the passenger transfer business, and is the principal agent in the transfer of freight at this point. On the east side of the river 12 railroads deliver to the Bridge & Tunnel Company's yard, either directly or indirectly, freight destined for St. Louis or Western roads, while on the west side of the river the four great lines, the Missouri Pacific, the Iron Mountain, the St. Louis & San Francisco, and the Wabash deliver freight to the company's yards in St. Louis.

The magnitude of this traffic may be seen from the following figures from the 13th annual report of the company for the year ending Dec. 31, 1887.

Tons carried	3,042,068
Cars moved over bridge	469,661
Average cars moved over per day	1,287
Trains transferred	59,302
Averaged trains transferred per day	131
Passengers carried	1,473,638

The movement of this traffic and the entrance to the yards of three important roads terminating in East St. Louis, is controlled by a system of interlocked switches and signals. This system comprises three operating stations; one in St. Louis, near Poplar street and the western end of the tunnel, another at Main street, at the western abutment of the bridge, and the third and principal station at East St. Louis at the eastern end of the east bridge approach. The first two stations named, although essential parts of the system, are comparatively small; that at Poplar street containing 20 and the Main street station 8 levers. The former controls the movement of trains between Union Depot and the west end of the tunnel, and the entrance to Tenth street yard. The Main street station operates two cross-overs at the west approach, with the necessary signals. These two stations are interlocked with each other by an electric locking apparatus in addition to the hydraulic mechanism, by which the station at the end of the tunnel farthest from an approaching train unlocks the signals for entering the tunnel. After the train has passed into the tunnel the signals are locked automatically to danger, from which position they cannot be released until the tunnel is again clear. With the exception of this electric apparatus the switch and signal mechanism in these two stations is the same as that of the East St. Louis station, which will be described in detail.

The accompanying diagram shows the tracks controlled by the interlocking system in East St. Louis and at Poplar street in St. Louis.

For the operation of our interlocking plant we maintain a pumping station and an air-compressing plant. These, with the necessary boilers and appurtenances, are located in the east abutment of the bridge. The waterworks consist of two Cameron pumps and one Deane pump, with the necessary amount of main and distributing pipes, stand-pipe, and two wrought-iron pressure tanks 12 ft. in diameter and 56 ft. high, situated near the Relay depot in East St. Louis. The compressor station is equipped with two Norwalk compressors, each with a capacity of 427 cu. ft. per minute, working at 150 revolutions. The steam cylinders are 14 by 16 in., intake air cylinders 14 by 16 in., and compressing cylinders 9½ by 16 in. In the large air cylinder the air is compressed to a pressure of 30 lbs. per sq. in.; the air then passes to the smaller cylinder, where it is compressed to 70 lbs. per sq. in. But one compressor is used at a time, the other being held in reserve. From the compressors a 4-in. main leads to a distributing reservoir placed in the east entrance to the bridge, and from here air is supplied to Main street and Poplar street stations in St. Louis, and to the East St. Louis tower.

In the operation of switches and signals by fluid pressure alone the use of compressed air is not essential; any motive power suitable for the purpose can be employed to drive the accumulator pumps, which is the only part in such a system that compressed air has to perform. In the interlocking plant of the Bridge & Tunnel Co. as it was originally erected by the Union Switch & Signal Co. (in 1883), the movement of the switches and signals was effected by hydraulic pressure solely, and the object had in view in establishing a compressor station in connection with the interlocking system was to supply power from a central station, thus avoiding the danger and inconvenience of separate boilers for each interlocking station and the expense of necessary attendants. But later improvements have led to the abandonment of the old hydraulic switch apparatus and the substitution of a mechanism in which the pressure of air is employed to move the switches, a column of fluid being used simply to operate the valves controlling the direction of the air pressure at the switches.* In the present state of our interlocking plant, therefore, compressed air is an essential part. These improvements, and others which will be noted, are the work of the Superintendent of Structure, Mr. Morris Wuerpel, to whose skill and ingenuity the present high state of efficiency of the system is mainly due.

Experiments have been made with various substances in order to obtain a non-freezing fluid. The liquid first used was wood alcohol, but this was found to be too expensive, and it was difficult to maintain the pipe connections and packings sufficiently tight to prevent leaking. Glycerine and solutions of various salts were tried, but they all had their disadvantages. The liquid now used is plain water during the warm weather, and a solution of chloride of calcium during the time when danger from frost is to be apprehended. The substitution of one fluid for the other is effected with no hindrance to the working of signals or switches.

As the East St. Louis station is the most important and extensive of the three, a description of it will cover the entire interlocking system at this place. The movement of all trains entering upon or leaving the Bridge & Tunnel Co.'s tracks in East St. Louis, and the crossings of those tracks by

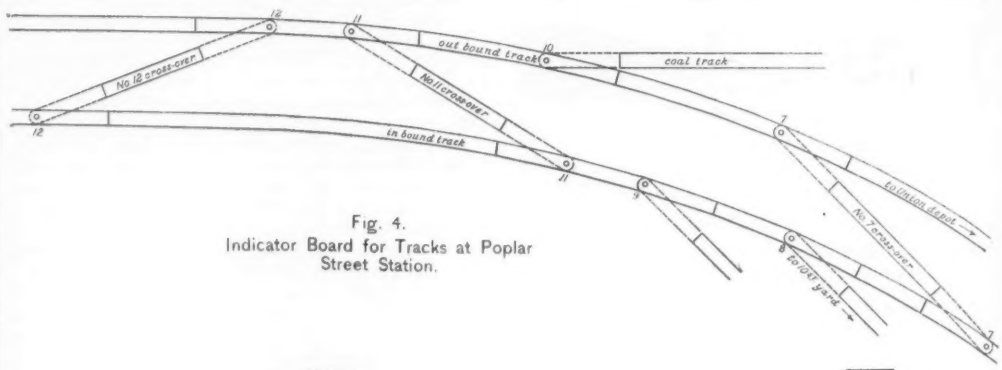
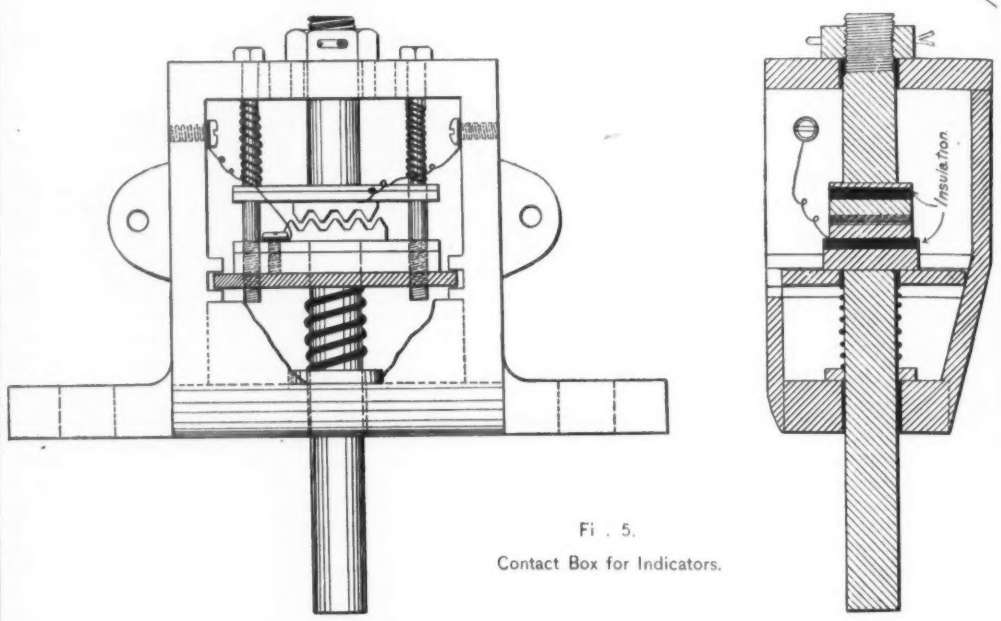


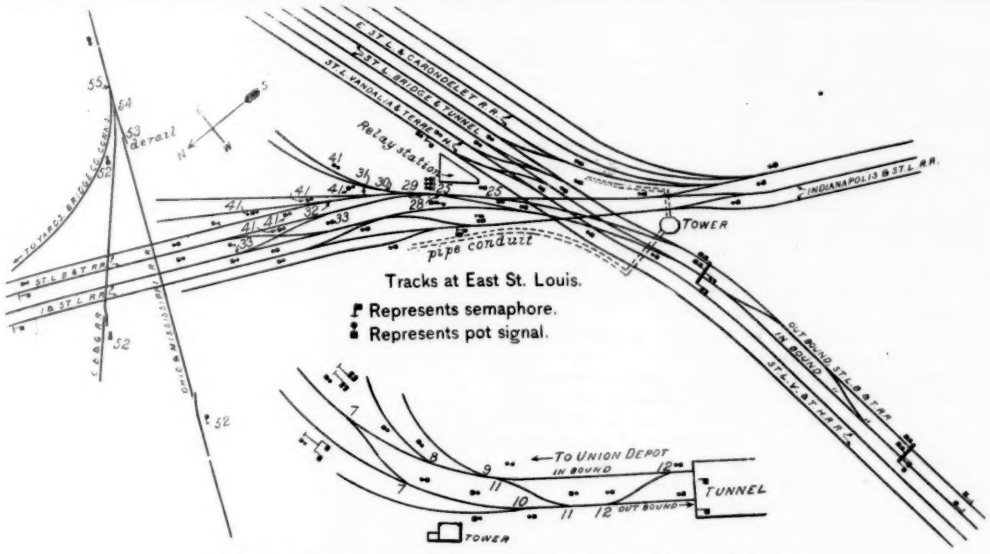
Fig. 4.
Indicator Board for Tracks at Poplar Street Station.



Fi . 5.
Contact Box for Indicators.

Plan, Cover Removed. *Section through Centre.*

*The same principle is used in the Westinghouse pneumatic interlocking described in the *Railroad Gazette* Dec. 21, 1888.—EDITOR.



Tracks at East St. Louis.

Represents semaphore.

Represents pot signal.

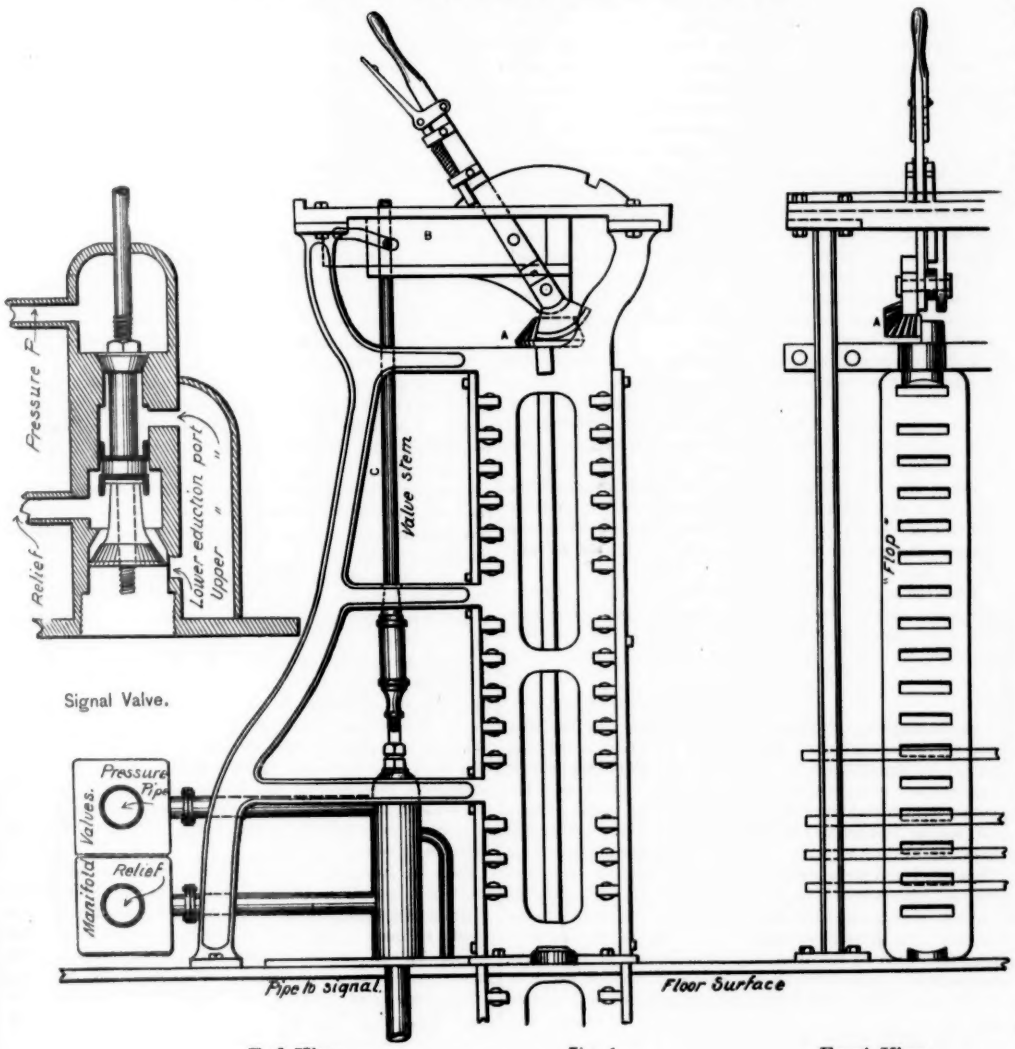
Tracks between Poplar Street and West Mouth of Tunnel, St. Louis.

the Indianapolis & St. Louis, the Vandalia, the Ohio & Mississippi and the Chicago, Burlington & Quincy are controlled from this station.

The station is a two-story octagonal wooden tower, with basement, placed at the intersection of the tracks of the Indianapolis & St. Louis and the Vandalia with those of the St. Louis Bridge & Tunnel Co. On the first floor are placed three hydraulic accumulators and their pumps, and an upright boiler which is ordinarily used as an air reservoir, but which can be fired up and used for generating steam in case of serious accident to the air compressing plant. The pumps are operated, as has been said, by compressed air supplied from the East abutment compressor station, and are made to work automatically in order to meet the constant demands made upon the accumulators by the operation of the switch and signal apparatus. The accumulators are so connected that they can be used singly or all together, as occasion demands.

The second story of the tower contains the telegraph operators' table, electric indicators and signal bells, and an 80-lever interlocking frame, which extends around five sides of the tower. Of these 80 levers 70 are in present use, the other ten being reserved for future extensions. But the efficiency of this system is not to be measured by the number of levers alone, for with these 70 levers we operate 138 switches and signals; and since one signal lever may operate, in a manner that will be explained later, nine different signals these 70 signals do the work of about 200 of the ordinary type of interlocking. Moreover, the levers being so small and so easily handled, it is necessary to have but one leverman on duty at a time. Three lever-men are regularly employed at this station, working in shifts of eight hours each.

The locking frame is of the Saxby & Farmer type, which is too well known to need further description; but the levers are adapted to the use of hydraulic pressure for operating the switches and signals, instead of the wires or rods in ordinary use. End and front elevations of a section of the locking frame, showing a signal lever and its connections, are



End View. Fig. 1. *Front View.*

Interlocking Frame and Section of Signal Valve.

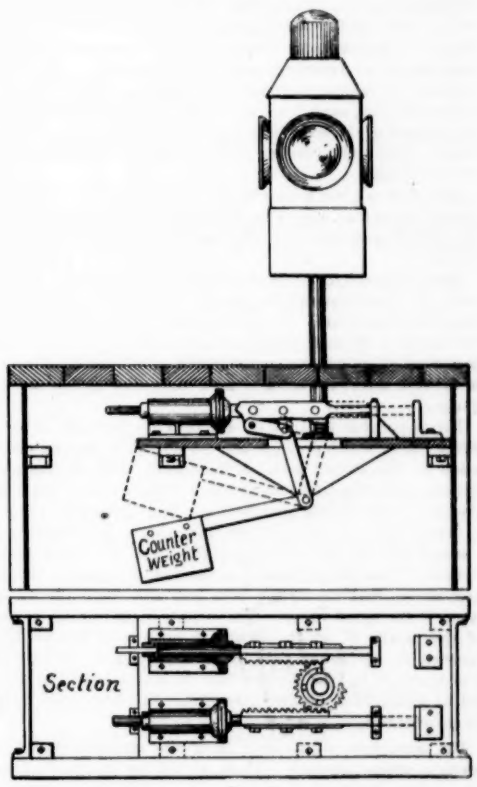
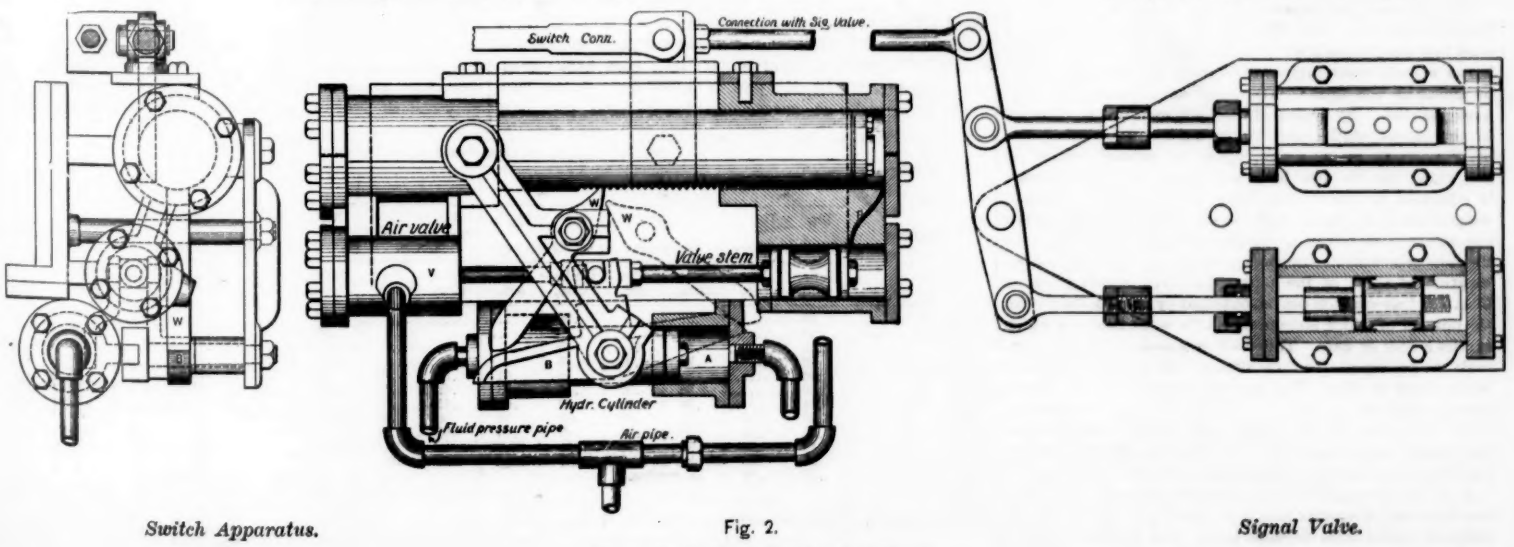


Fig. 3.

Wuerpel's Three-Position Pot Signal.



Switch Apparatus. Fig. 2. *Signal Valve.*

Wuerpel's Hydro-Pneumatic Apparatus.

INTERLOCKING AT THE ST. LOUIS BRIDGE.

given in fig. 1. The locking frame is divided into five sections of sixteen levers each.

In front of the frame, between it and the sides of the building, is a series of "manifold" valves (shown in section in fig. 1), the upper pipe of which, called the pressure pipe, is filled with fluid, under pressure, from the accumulators; the lower pipe, called the "relief," is not connected with the accumulators, and the fluid it contains is, therefore, under no pressure except that due to the hydrostatic pressure.

Upon reversing the lever (which is here shown in its normal position, that is to say, giving a red signal) the flap is revolved a quarter turn by means of the bevel gear segment *A*, by which motion the locking is effected. At the same time the cam plate *B* is drawn back, lifting the valve stem *C*, which raises the upper part of the valve off its seat and closes the lower portion. Communication is thus established between the pressure pipe and the upper eduction port, whence the pressure is transmitted through the lower eduction port to the column of fluid in the distributing pipe. At the signal end of this pipe a simple ram is used to operate the semaphore or the pot signal. When the lever is restored to its normal position the position of the valves is reversed, and the lower eduction port is opened to the relief, thereby releasing the pressure from the signal and distributing pipe. A counterweight brings the signal to the normal position (danger), at the same time forcing the piston to the normal end of the cylinder. The small amount of fluid thus displaced passes back through the distributing and relief pipes, and is discharged into a tank on top of the tower, whence it is returned to the pumps.

The operation of the switch levers is precisely the same as that of the signal lever, except that, since in this case the use of a counterweight is impracticable, pressure must be applied to the piston in the switch cylinder to bring it back to its normal position; hence two pressure pipes, the "normal" and the "reverse," are connected with each switch movement and with each switch lever.

The distributing pipes pass down from the lever room to the basement, from which they are distributed through the area covered by the interlocking by means of brick conduits. These conduits are large enough to afford easy access to the pipes which are arranged upon the walls in racks. For convenience in tracing the pipes brass tags are attached at frequent intervals, each bearing a number corresponding with the number of the lever in the tower to which the pipe belongs. Over 65,000 feet of pipe is used at the East St. Louis station alone.

[Mr. Eayres gives a careful description of the hydraulic switch apparatus, which has been superseded by the hydro-pneumatic apparatus and therefore is not printed here.—Editor.]

The Wuerpel hydro-pneumatic switch apparatus is shown in fig. 2. This apparatus is much simpler in construction than the original one. It is very prompt in action; and as the stroke of the main piston is an inch and a half more than the throw of switch, the switch points cannot fail to close up to the rail, unless the track is more than 1½ inches out of gauge.

The apparatus consists of a hydraulic cylinder *A* into either end of which pressure can be admitted by the operation of the switch lever in the tower. The piston of this cylinder carries a forked arm which engages with a stud on the stem of the double air valve *V*. The movement of the hydraulic piston operates the air valve, by which air pressure is admitted, by means of the ports *P*, to the main cylinder. The main piston is connected, by means of the arm shown, with the switch rod, and also with the valve stems to the signal valves. The locking is effected by means of the pawls *W* which engage in teeth cut in a steel plate inserted in the lower part of the main piston. The pawls are operated by the rocking bar *B*, whose motion is coincident with that of the air valve stem. The free pawl falls, by its own weight, into position for locking.

The semaphore signal used is of the ordinary type and needs no special mention. These, as well as the pot-signals, are operated by fluid pressure alone, acting upon a simple form of ram, the plunger of which is connected by suitable means with the semaphore blade or pot signal.

The pot-signal used is shown in fig. 3, which represents a three-position pot. On the sides of an iron box which is sunk into the ground with its top at the level of the ties, is borne a shelf which supports two rams and the signal staff, as shown in the figure. The rams are placed with their axes parallel. By means of the pinion which is clamped to the signal staff, and which meshes into either one of the racks shown, the signal is rotated either to the right or to the left, according as the pressure is admitted to one or the other of the rams. Counterweights bring the signal back to the danger position when the pressure is released. The three-position pot shows on the sides which will be opposed to approaching trains a combination of three of the four colors—red, white, green or blue. A four-position pot is obtained by an auxiliary ram, the plunger of which is connected with a vertical rod which carries a door or gate. This door is painted red and conceals the pot signal, the three sides of which are, in this case, white, green or blue. The normal position of the door is closed; when the signal lever in the tower is reversed the door opens, but the pot signal may remain stationary or may rotate toward the right or to the left, according to the position of the switches through which the train is to pass.

It is by passing the fluid pressure through one switch movement after another that it is possible to get so many different signals from the same lever. For instance, the single pot signal 25 and the group of three (all numbered 25 and shown near the relay depot on the diagram) are all operated by lever No. 25 in the tower. The single signal is a four-position one, the others three-position. Disregarding the danger signals (the red faces) either one of the three faces of the single pot No. 25 can be used either alone or in conjunction with either one of the two faces of each of the pots No. 25 in the group of three. As at present used, lever No. 25 gives nine different "clear" signals, according to the position of switches 28, 29, 30, 31, 32 and 33. Lever 41 operates six three-position pot signals for movement of trains through the same switches in the opposite direction. Again, lever No. 52 operates either a semaphore (52) at the west derailing switch on the Ohio & Mississippi crossing, or either one of the two pot signals (52) which control the C., B. & Q. crossing or the connection with the bridge yard, according as switch 53, 54 or 55 is in use.

A brief explanation may be necessary to make clear the course which the pressure takes in passing through switch movements. A simple illustration is found in switches 28 and 30. It will be noticed from the diagram that signals are placed at the right side of the track to which they refer, and that of the three pot signals, numbered 25, the right hand one (facing north) governs the right hand track, the middle governs the middle track, and the left hand pot the left hand track. The pressure-pipe from signal lever 25 in the tower goes direct to the door of the single pot No. 25, and, by a branch, enters the centre port of the signal valve at 28 switch. From the other two ports of this valve two pressure pipes leads out, the "normal" and the "reverse," the terms referring to the position of the switch. Of these two pipes the "reverse" enters the centre port of the signal valve connected with No. 30 switch, the other two ports being connected with the two cylinders of the right hand pot signal. Now, when switch 28 is set for the right hand track, and switch 30 is also set for the right hand track, the signal lever 25 on being reversed admits pressure first to the door of the single four-position pot 25, the pressure then enters the centre port of the signal valve at No. 28, passes out of the reverse port and to the centre port of No. 30, thence through the normal port to one of the cylinders at the pot signal, causing the signal to rotate to the left, and show a green signal. If switch 30 is set for the side track, the pressure passes through the reverse port and acts upon the other cylinder, causing the signal to rotate in the opposite direction and show a white signal.

Indicator boards (see fig. 4) showing fac-similes of the tracks are placed in the tower in front of the levers to which they refer. The tracks are represented on these boards by strips of metal, the switches by pieces of metal pivoted at one end, turning upon shafts which are connected with electro-magnets on the back of the board.

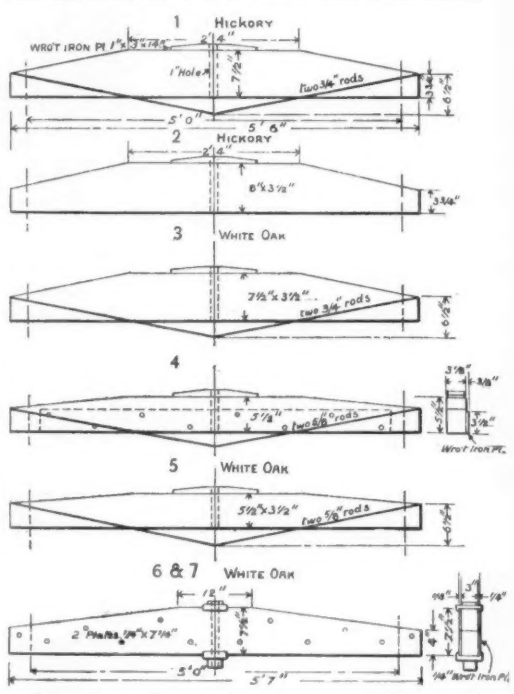
Fig. 5 shows the form of contact box used in connection with the hydro-pneumatic switch apparatus. It is bolted to the web of the rail, one on each rail opposite the switch points. The manner in which contact is effected is sufficiently clear from the figure.

With the exception of the contact boxes, all the mechanism connected with the switch and signal movements, all pipes and connections are underground and out of danger from derailments.

Brake Beams.

In the majority of the rules and instructions for the care and use of the air brakes, issued by the various railroad companies for the guidance of their employés, particular care is enjoined not to allow the slack to become so great that the piston will travel over 8 or 9 in. On heavy passenger cars this has to be carefully watched and the slack frequently taken up by dead levers or the under connection of the trucks. That this is not always attended to as promptly as might be desired, especially if it necessitates taking up the lower connection, is apparent to all who have paid any attention to the subject. To determine how much of the piston travel is caused entirely by the springing or deflection of the brake beams in the centre when the air pressure is applied, and how much more efficient the brake arrangement can be made by the use of stiffer brake beams than those in ordinary use, were the objects of the investigations the results of which are shown in the appended table.

A passenger car weighing 50,000 lbs. would require at 80 per cent. of total weight a breaking force of 40,000 lbs. Each of its 4 brake beams would have to withstand a pull of 10,000 lbs. in its centre. Or if a car weighing 40,000 lbs. requires a braking force of 32,000 lbs., each brake beam would have to withstand a pull of 8,000 lbs. It has been found by a series of careful experiments, that with new



Brake Beams Tested. Results shown in table herewith.

Note.—*All brake beams were supported at 5-ft. centres. All but No. 7 were 6 ft. long and 3¾ in. wide at ends.*

white oak brake beams 3½ in. × 5½ in., supports 5 ft. apart trussed with two ¾ in. rods, and loaded in the centre under as near as possible the same conditions as in actual use on a car, the deflection was with 8,000 lbs. loads, $\frac{5}{16}$ of an in., and with 10,000 lbs. nearly $\frac{13}{32}$ of an in. The former represents a piston travel of 2½ in. and the latter 4 in. due to the spring of the beam alone.

Even brake beams 5½ in. × 7½ in. trussed with ¾ in. rods which would be considered much larger than the average in ordinary use, deflected under 10,000 lbs. load over ¼ in., representing 2½ in. movement of piston in one case and 2 in. in the other. How much more these beams will spring after being in service for a few months and withstanding the pull of the levers several thousand times, when the truss rods have become loosened and the timber shrunk, we will not attempt to state.

A certain amount of lost motion in the pin connections, etc., is unavoidable, and as usually put up with key bolts amounts to rarely ever less than $\frac{1}{16}$ in. In each hole and often ⅛ of an inch.

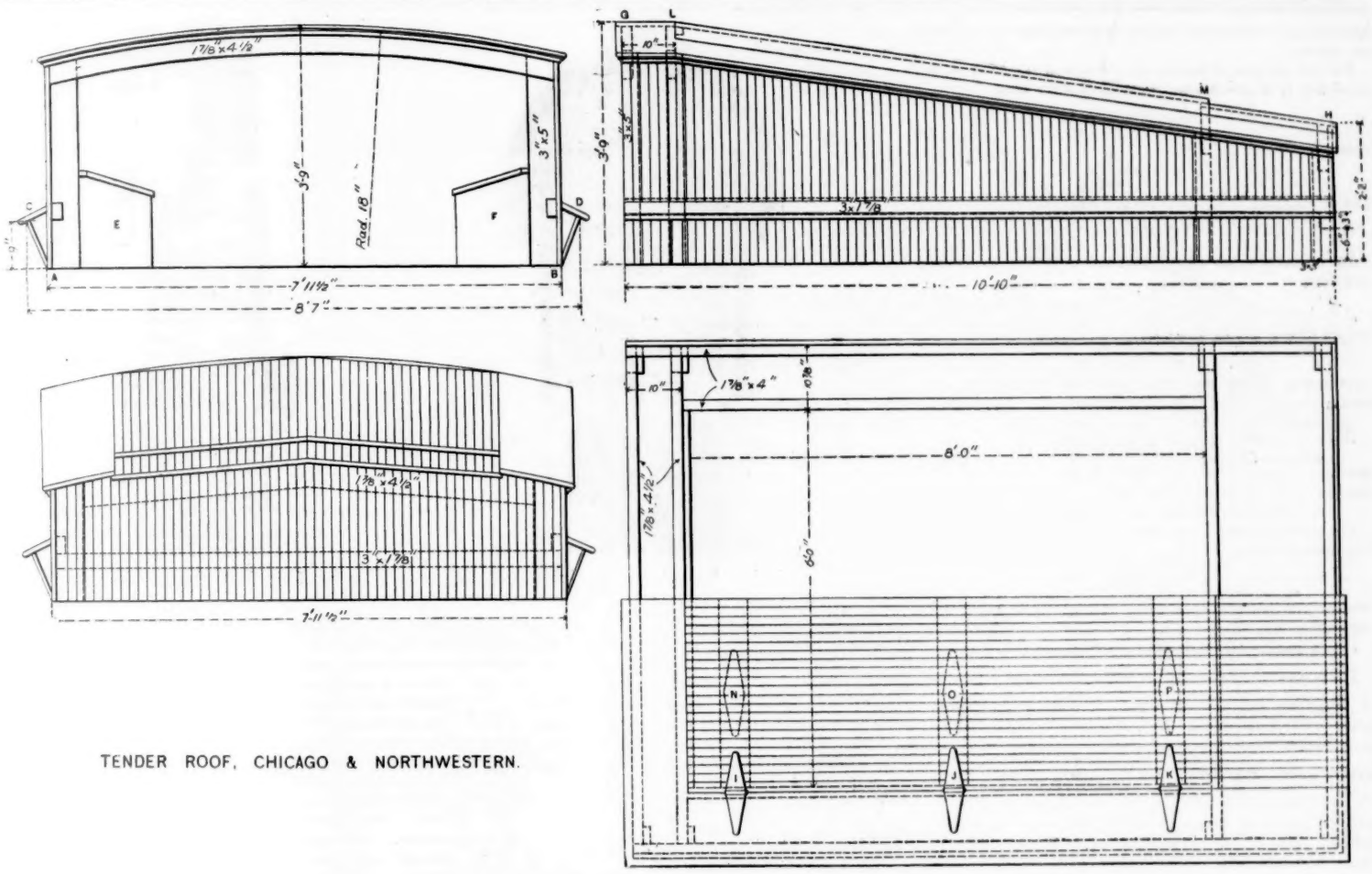
It will be readily seen that by adding the amount of motion necessary to take up the slack to the amount caused by the spring of the beams, quite a considerable portion of the 12 in. maximum travel of the air cylinder piston is consumed in ineffectual work. Add to this the clearance of the shoe from the wheel, say ¼ of an inch, which is a small allowance, representing 2½ in. piston travel with 40,000 lbs. braking power, and the great necessity of continually adjusting the connections and taking up the slack is in a measure explained.

From the foregoing statement it will be readily seen that much of this could be avoided by the use of stiffer beams. What would seem most desirable would be a beam combining great stiffness with say a deflection of less than ⅛ of an in. under 10,000 lbs. load, without any loose parts, such as truss rods, etc., to jar and work loose and impair the safety and strength of the beam, without being too heavy or clumsy, and on which the brake head and levers could be readily applied. Several different kinds of wrought-iron and steel beams, or combination beams of wood, plated on both sides with iron and riveted or bolted through and through, are now being made and used to a limited extent. Some of these possess considerable merit, and although when first introduced were not always entirely satisfactory in every particular, yet the defects are gradually being eliminated and are already much improvement over the old wooden beams. The table of brake

Test of Brake Beams, Passenger Trucks.

Load.	1. 3½″ × 7½″. ¾″ truss rod.		2. 3½″ × 8″. No truss.		3. 3½″ × 7½″. ¾″ truss rod.		4. 3½″ × 5½″. One ⅜ × 3½″ plate.		5. 3½″ × 5½″. ⅝″ truss rods.		6. 3½″ × 7½″. Plated.		7. Same as No. 6.	
	Deflection.	Per. set.	Deflection.	Per. set.	Deflection.	Per. set.	Deflection.	Per. set.	Deflection.	Per. set.	Deflection.	Per. set.	Deflection.	Per. set.
2,000	.06	.....	.07	.....	.06	.....	.....	.....	.15	.....	.01	.....	.01	.....
4,000	.11	.....	.11	.....	.10	.....	.....	.....	.20	.02	.04	.....	.04	.....
6,000	.16	.....	.15	.....	.20	.....	.....	.....	.28	.02	.07	.....	.08	.....
8,000	.22	.....	.22	.01	.26	.....	.....	.....	.33	.02	.09	.....	.10	.02
10,000	.26	.....	.25	.02	.40	.01	.36	.03	.41	.02	.12	.01	.12	.02
12,000	.30	.....	.30	.02	.46	.03	.42	.05	.48	.05	.14	.01	.20	.07
14,000	.34	.....	.36	.02	.53	.06	.45	.08	.60	.07	.15	.02	.22	.07
16,000	.36	.01	.43	.02	.69	.10	.50	.08	Broke at 16,300 in centre of beam.		.19	.02	.28	.08
18,000	.42	.03	.53	.03	.87	.19	.61	.11			.21	.03	.31	.11
20,000	.43	.04	.64	.06	Broke at 20,000 end casting.		Broke at 19,500 end casting.				.24	.04	.34	.15
22,000	.50	.05	Broke at 22,600 in centre.								.28	.07	.41	.18
24,000	.66	.09									.37	.13	.50	.24
26,000	.76	.14									.44	.21	Failed at 27,400 lbs. by plates buckling; wood crushed betw'n 10,000 and 12,000 at supports.	
28,000	End casting broke at 28,000 lbs.										.56	.33		
30,000											Failed at 30,000 lbs., plates buckled.			

Centre of shoes with pieces 6″ wide, same as shoe.



TENDER ROOF, CHICAGO & NORTHWESTERN.

beam tests shows clearly the necessity of stiffer beams than Nos. 1 to 5, and the marked superiority of the combination or plated beams 6 and 7. The diagrams show the dimensions and design of the brake beams.

Tender Roof, Chicago & Northwestern.

The accompanying cut shows a covering which is used over the tenders of the locomotives on the Chicago & Northwestern for the purpose of protecting the coal from snow and sleet, and in a measure to shield the firemen from the icy blasts which are sometimes felt in the districts traversed by the northern branches of this road.

This covering is made of pine, tongued and grooved together, as shown in the cut. At *C* and *D* is a water-shed which carries all of the drainage outside of the collar of the tank; *E* and *F* are the regular tank tool boxes. The roof is inclined backwards, as shown, *G* being the front of the covering. The main portion of the roof consists of two large doors hinged at *I*, *J* and *K*, also at *N*, *O* and *P*, which allows the cover to be folded back while doubled up. This covering extends from *L* to *M*. When coal is being delivered to the tender these roof doors are thrown wide open and are closed after the tender is filled. Stops are provided, as shown, at *L* and *M*, upon which the doors rest.

This covering is found to be quite essential to prevent the coal from becoming not only frozen together, but too much "water soaked" to be economical. Some of the coals in the northwestern part of the country are used fresh from the mines, and their evaporating power is often reduced by the amount of moisture they contain, and any additional moisture, resulting from storms of rain or snow, would be seriously detrimental, and frequently this is the sole cause of lack of steam power. Sometimes, in cases of blizzards, it is very difficult for firemen to satisfactorily perform their duty without a protection of the kind shown in the illustration. The Chicago & Northwestern built last winter two of the largest snow plows ever constructed, for their Northern branches, and it is for the locomotives used in the "blizzard" country that this tank covering has been designed.

Transition Curves.*

(Copyright, 1889, by E. A. Giesler.)

FROM THE GERMAN, BY E. A. GIESELER.

II.

2. THE EQUATION FOR TRANSITION CURVES.

From equations (1) and (2) it follows that, given a certain maximum velocity of train, the elevation e of the outer rail must be inversely proportional to the radius of curvature. When the circular curve is started from the tangent direct, this condition clearly cannot be fulfilled; this can only be done by inserting between the tangent and the circular curve a transition curve, the radius of curvature of which, commencing with infinity, gradually decreases until it is equal to R, while in the meantime the elevation of its outer rail, commencing with O, increases uniformly until it is equal to e.

In order to inquire into the nature of the curve required for this purpose we will use the following nomenclature:

Let x and y be the co-ordinates of any point on the curve, with reference to the tangent as the axis of abscissas and the tangent point as the commencement of co-ordinates.

e_x = the elevation of outer rail at such point.

r = the radius of curvature of transition curve at such point.

$\frac{1}{i}$ = the tangent of the angle of the outer rail of the transition curve with the horizontal.

Then we have:

$$e_x = \frac{x}{i} \tag{3}$$

and according to equation (1)

$$e_x = \frac{g\,v^2}{32.2\,r}$$

from which follows:

$$\frac{x}{i} = \frac{g\,v^2}{32.2\,r}$$

or

$$r = \frac{i\,g\,v^2}{32.2\,x}. \tag{4}$$

Substituting for the constant value

$$\frac{i\,g\,v^2}{32.2} = P, \tag{5}$$

we obtain

$$r = \frac{P}{x}. \tag{6}$$

According to the well known general equation for radius of curvature, we further have

$$r = \frac{(d\,s)^3}{d\,x\,d^2\,y}.$$

Considering that the transition curve at no point departs much from the tangent, and that therefore its length is practically equal to the length of the abscissa, we can put $d\,s = d\,x$, by which we obtain

$$r = \frac{(d\,x)^2}{d^2\,y} \tag{7}$$

From equations (6) and (7) now follows

$$\frac{(d\,x)^2}{d^2\,y} = \frac{P}{x}$$

or

$$\frac{d^2\,y}{(d\,x)^2} = \frac{x}{P} \tag{8}$$

integration of which gives

$$\frac{d\,y}{d\,x} = \frac{x^2}{2\,P} \tag{9}$$

Integrating once more we obtain the equation of the transition curve

$$y = \frac{x^3}{6\,P} \tag{10}$$

which is that of a cubic parabola.

The entire length l of the transition curve, as remarked above, is practically equal to the abscissa of its terminal point, and is, therefore, found from equation (6) by substituting $x = l$ and $r = R$, which gives

$$l = \frac{P}{R} \tag{11}$$

The ordinate k of the terminal point is found from equations (10) and (11).

$$k = \frac{l^3}{6\,P} = \frac{l^2}{6\,R} \tag{12}$$

The following deductions will serve to determine the position of the transition curve with reference to the circular curve.

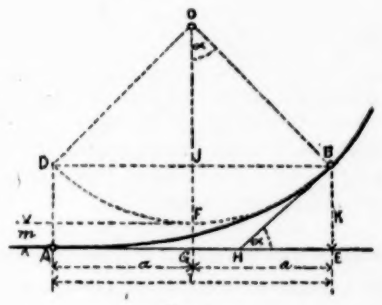


Fig. 1.

In fig. 1 we will designate—

A as the tangent point and the commencement of the transition curve as well as of the co-ordinates.

B the terminal point of transition curve.

l and k the co-ordinates for this point.

a and m the co-ordinates for the original tangent point of the circular curve.

R the radius $O\,B$ of the latter.

α the central angle pertaining to the part $F\,B$ of the circular curve, and also the angle of intersection between the tangent in B and the abscissa.

Now we obtain from the figure.

$$\text{tang}\,\alpha = \frac{l-a}{R-J\,F}$$

$J\,F$ will always be very small as compared with R, and may therefore be neglected, which renders

$$\text{tang}\,\alpha = \frac{l-a}{R} \tag{13}$$

$B\,H$ being tangential in B to the transition curve, as well as the circle, we obtain according to equation (9)

$$\text{tang}\,\alpha = \frac{d\,y}{d\,x} = \frac{x^2}{2\,P}$$

Now, we have from equation (11) $P = l\,R$, and for the terminal point of transition curve $x = l$, substituting which gives

$$\text{tang}\,\alpha = \frac{l}{2\,R} \tag{14}$$

From equation (13) and (14) follows

$$\frac{l-a}{R} = \frac{l}{2\,R}$$

or

$$a = \frac{l}{2} \tag{15}$$

that is half of the length of the transition curves lies before

* The above article will be published with appended tables by the Brandis Manufacturing Company, 55 Fulton street, New York. The first part of this paper appeared in the *Railroad Gazette* of Jan. 4.

and half of it behind the original tangent point of the circular curve.

For the purpose of finding the position of the point of intersection H of abscissa and tangent $H\,B$ we have

$$\frac{k}{H\,E} = \text{tang } \alpha$$

consequently

$$H\,E = \frac{k}{\text{tang } \alpha}$$

and substituting from equations (12) and (14)

$$H\,E = \frac{l}{3} \tag{16}$$

The ordinate m, for the lowest point of the inside, we find as follows:

$$m = k - J\,F$$

$J\,F$, being very small, may be expressed by the well-known formula

$$J\,F = \frac{l^2}{8\,R}$$

substituting which, and also employing equation (12), we obtain

$$m = \frac{l^2}{6\,R} - \frac{l^2}{8\,R} = \frac{l^2}{24\,R} = \frac{k}{4} \tag{17}$$

that is m is equal to the fourth part of the ordinate of the terminal point of the transition curve.

3. THE SELECTION OF THE CONSTANT VALUES.

The constant value P contained in the equation (10) of the transition curve is

$$P = \frac{g\,v^2\,i}{32.2}$$

wherein g is the distance between centres of rails, that is, for standard gauge, say $g = 4.9$.

v the velocity of train in feet per second, say 56.5 ft.

The tangent $\frac{1}{i}$ of the angle of inclination of the outer rail of transition curve is generally assumed at somewhere between 0.001 and 0.004. It is, of course, desirable to have it as small as possible, in other words, to give the outer rail as easy a grade as possible. But the smaller $\frac{1}{i}$, the larger P, and consequently the larger l, and inasmuch as l is situated half way before and half way after the original tangent point of the circular curve, an increase of P will cause a lengthening of the entire curve, which may frequently be inconvenient on account of local circumstances. For this reason the selection of too large a value for P is objectionable from a practical point of view.

As a general rule it may be assumed that the greater the radius of a curve, the less will its extent in length be limited by local considerations, while the employment of small radii is mostly necessitated by local obstacles, which will at the same time prevent a considerable extent of the curve in length. In consideration of this it appears advisable not to assume a constant value for P in all cases, but to increase this value for increasing radii, whereby the inclination of the outer rail of the transition curve will become the easier, the greater the radius. The appended tables have been computed in accordance with this line of argument, with this exception, however, that the constant value of 0.00374 has been assumed for $\frac{1}{i}$ for all curves from 7° to 3°, or for all radii from 819.02 ft. to 1610.08 ft., thus obtaining for these curves the constant value of

$$P = 130{,}000. \tag{23}$$

The length of transition curve, $l = \frac{P}{R}$, in these cases will therefore be greater for shorter radii than for long ones, but will never exceed 159 ft.

From 1910.08 ft. radius (3° curve) to 5729.65 ft. radius (1° curve), the length of transition curve is assumed at the constant value of 68 ft. Consequently we have in these cases:

$$P = 68\,R, \tag{24}$$

that is, P increases in the same ratio as the radius, the inclination of the outer rail in the meantime diminishing from 0.00374 to 0.00125.

These figures are based on the assumption that the elevation of outer rail is commenced at the commencing point of the transition curve. But when the rule given in the first paragraph is complied with, that is, when the elevation of the outer rail is commenced on the tangent, in such a way that half of the entire slope is situated on the latter, while the other half is situated on the transition curve, then the tangent of the angle of inclination of outer rail will only be half as large as the values given above, that is it will diminish from 0.00187 for the sharper curves to 0.00062 for a 1° curve.

Although the tables are computed for the values of $\frac{1}{i}$, corresponding to equations (23) and (24), it should be well understood that this lengthening of the slope and thus diminishing its grade should be introduced as a subsequent correction whenever possible.

4. LAYING OUT TRANSITION CURVES.

In tables No. 1 and No. 2 will be found all the required data for laying out transition curves for curves from 7 deg. to 1 deg. curvature on new location. Inserting transition curves into existing track requires different data and will be treated of further below.

Table 1 contains l and k, the co-ordinates of the terminal point of the transition curve, and table 2 contains the ordinates for intermediate points from 20 to 20 ft. These intermediate ordinates are the same for all curves from 7 deg. to 3 deg. curvature, the value P for these having been assumed as constant.

After the transition curve has been located the circular curve is laid out in the ordinary manner by starting from the tangent common to it and the transition curve at the terminal point of the latter, point A, fig. 1. The direction of this tangent can be fixed according to equation (16), but when the transition curve is short it is better to lay out the above tangent by means of the angle α, which it encloses with the abscissa, or the straight part of the track. For this purpose the values of α are given in Table No. 1.

The circular curve can also be laid out by starting from F fig. 1, that is the point in which it is tangent to the direction of the straight track; the ordinate of this point according to equation (17) is $\frac{k}{4}$, and can, therefore, easily be found from table 1.

Say, for instance, that a transition curve for a 5° circular curve is to be laid out, then we find from table 1 the co-ordinates of its terminal point at 113.41 ft. and 1.87 ft. From table 2 we take the intermediate ordinates corresponding to abscissas of 20, 40, 60, 80 and 100 ft., 0.01, 0.08, 0.28, 0.66, 1.28. After the transition curve is located, we proceed to lay out the circular curve, and for this purpose set up the instrument at H, fig. 1, laying off from here the angle α, which in this case is 2° 50′ 8″. Having thus obtained the direction of tangent at the terminal point of the transition curve, we set up on the latter and proceed to locate the circular curve in the ordinary manner.

TABLE NO. 1.

Slope of outer rail, co-ordinates of terminal point of transition curve and angle inclosed between straight track and tangent common to both curves.

Degree of curve.	$\frac{1}{i}$	l feet.	k feet.	α.
7° 00′	0.00374	158.72	5.13	5° 33′ 38
6° 45′	"	153.06	4.60	5° 10′ 12
6° 30′	"	147.40	4.11	4° 47′ 37
6° 15′	"	141.73	3.65	4° 25′ 53
6° 00′	"	136.07	3.23	4° 05′ 02
5° 45′	"	130.40	2.84	3° 45′ 00
5° 30′	"	124.74	2.49	3° 25′ 52
5° 15′	"	119.07	2.17	3° 07′ 34
5° 00′	"	113.41	1.87	2° 50′ 08
4° 45′	"	107.74	1.60	2° 33′ 32
4° 30′	"	102.08	1.36	2° 17′ 48
4° 15′	"	96.41	1.15	2° 02′ 55
4° 00′	"	90.74	0.96	1° 48′ 53
3° 45′	"	85.07	0.79	1° 35′ 42
3° 30′	"	79.40	0.64	1° 23′ 22
3° 15′	"	73.78	0.51	1° 11′ 53
3° 00′	"	68.06	0.40	1° 01′ 15
2° 45′	0.00343	68.00	0.37	0° 56′ 06
2° 30′	0.00312	68.00	0.34	0° 51′ 00
2° 15′	0.00280	68.00	0.30	0° 45′ 54
2° 00′	0.00250	68.00	0.27	0° 40′ 48
1° 45′	0.00218	68.00	0.24	0° 35′ 42
1° 30′	0.00187	68.00	0.20	0° 30′ 36
1° 15′	0.00156	68.00	0.17	0° 25′ 30
1° 00′	0.00125	68.00	0.14	0° 20′ 24

NOTE.—$\frac{1}{i}$ = Tangent of angle of inclination of outer rail to horizontal.

See Fig. 1. l = length of transition curve = abscissa of terminal point of transition curve. k = ordinate of terminal point of transition curve. α = angle inclosed by abscissa and tangent at terminal point of transition curve.

TABLE NO. 2.

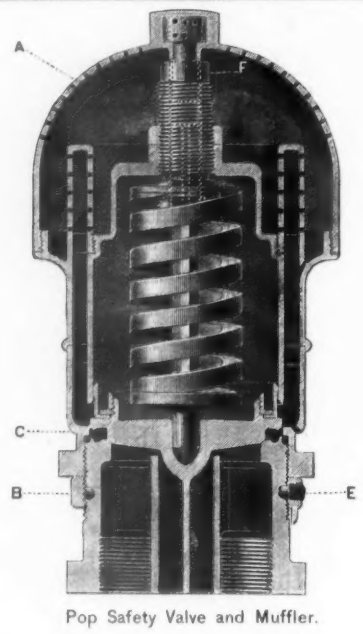
Co-ordinates of intermediate points on transition curve.

Abscissas.	Degree of curve. From 7° 00′ to 3° 00′ Ordinates.	2° 45′ Ordinates.	2° 30′ Ordinates.	2° 15′ Ordinates.	2° 00′ Ordinates.	1° 45′ Ordinates.	1° 30′ Ordinates.	1° 15′ Ordinates.	1° 00′ Ordinates.
20	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
40	0.08	0.08	0.07	0.06	0.05	0.05	0.04	0.03	0.03
60	0.28	0.25	0.23	0.21	0.18	0.16	0.14	0.12	0.09
80	0.66								
100	1.28								
120	2.27								
140	3.52								

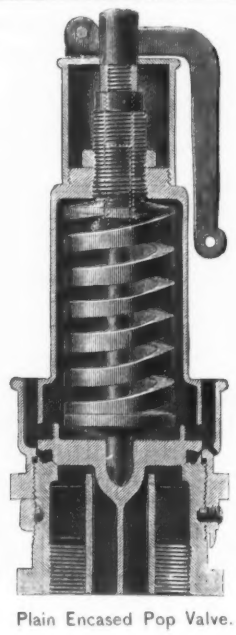
The Coale Muffler Safety Valve.

The illustrations herewith show a muffler safety valve and a plain incased pop valve, which is quite extensively used on several of the railroads in the Eastern and Middle states.

It is claimed for this pop valve that it is more durable and reliable than the ordinary forms. In the plain incased pop valve the same principles of construction, in general, are followed, as in the muffler safety valve, and a description of one suffices for both. The cap at A, which acts as a muffler, is dome shaped, with perforations as shown. At the top of the cap is a hexagonal boss by means of which the cap is screwed on to the lower portion of the casing. This hexagonal boss is perforated with holes as shown. The lower casing of the valve carries the adjustable lip which is shown at C. B is a check nut held in position by the set screw E. The valve is guided by a long spindle with wings, fitted into the socket below, the socket being attached to the valve seat as usual. The lip on the valve fits into the interior case on the muffler. The condensation in the cap and casing passes out through small openings shown in the cut at the base of the casing.



Pop Safety Valve and Muffler.



Plain Encased Pop Valve.

The operation of this valve is about as follows: Steam passing through the valve passes by the adjustable lip through the space between the inner and the outer casings, out of the small perforations in the inner casing into the cavity of the cap, out of which it passes into the atmosphere through the perforations shown at A. Any steam which may, by chance, leak into the interior of the cavity passes up around the spring spindle, which has wings upon it thus leaving a clear passage for the steam between it and the adjustable nut F. This steam then passes up through the hollow projection on the underside of the cap, which projection fits into the adjustable nut, thus preventing leakage into the main cavity A, and out through the perforations in the hexagonal boss at the top.

The several points of advantage claimed for this valve are:

1. The wings underneath the valve are small and do not extend close out to the seat of the valve, thus reducing liability of grooving the valve seat. When the valve wings extend out close to the seat, the division in the steam current caused by these wings tends to cut away the valve seat and cause leakage.

2. Automatic adjusting ring, which obviates to a great extent the friction between the lip on the valve and the interior casing.

3. Owing to a system of drainage it is practically impossible for this valve to freeze up.

The adjustment of this valve is performed as follows:

Remove the cap A by placing a wrench upon the hexagonal boss at the top; this will expose the adjustable nut F. Slacken the check nut and screw down the hollow spring nut F until the valve is set at the desired pressure. Adjust the range of working of this valve during changing of pressure by screwing down or up the adjustable case C, by means of the wrench placed on the hexagonal part at its base, until the boiler pressure is reduced the desired number of pounds before the valve closes, after blowing off, then screw the check nut B back against the case C, and fasten this check nut by means of the set screw E.

When the valve is taken apart it is not necessary to remove the check nut B. It is rather better to leave it in position when once set at the proper point.

This muffled safety valve, and the plain encased pop valve, are intended to be placed together upon the same locomotive, the object being to provide a muffler safety valve for constant use, and an extra, plain pop valve as usual set at a higher pressure, and connected by means of a cord to the cab in such a manner that the engineer can reduce the boiler pressure to any desired point to test the muffler safety valve when desired without leaving his seat.

This valve is made by the Coale Muffler Safety Valve Co., Baltimore, Md.

Novel Use of Car Heating Appliances.

At Whitehall, on the line of the Delaware & Hudson Canal Co's railroads, much trouble has been experienced and expense involved in the past in order to keep a safe passageway for trains in the winter on account of the rapid accumulation of ice in a tunnel about 1,000 ft. long. A large amount of drainage from the village streets enters this tunnel through bench walls and from beneath the foundations, and, as the

surface of the ground is but about 6 ft. above the arch, and a strong current of wind is constantly passing through the tunnel, this drainage freezes rapidly, filling the ditches and covering the tracks. A force of men has been kept constantly at work during past winters between Dec. 1 and April 1, cutting and removing this ice. The idea was suggested of pumping a current of hot water through the ditches to keep them open This was improved upon by Mr. R. C. Blackall, Superintendent of Machinery of the company, who suggested and carried out the idea of using for this purpose the automatic circulation of the McElroy car heating system, in use now on the trains of the Delaware & Hudson Canal Co. It had proved entirely satisfactory and easily managed as a train heating appliance, and there seemed to be no reason why it would not prove equally applicable to tunnel heating.

A small 10 H P. boiler was erected and a McElroy "commingler" and circuit of about 2,000 ft. of 2-in. pipe laid straight, the return pipe being but 3 in. from that carrying the outward flow of hot water.

Circulation was started Jan. 7, and since then there has been no break in the floor, while the ditch has been kept entirely free from ice, although the temperature has reached 22 deg. below zero. The result has been entirely satisfactory in every way, and the economy in track work and safety of operating trains has been greatly increased. The greatest pressure at any time at the boiler has been 60 lbs. and the average has not exceeded one-half of this.

A Station on the Baltimore & Ohio.

The station building illustrated here contains on the first floor two waiting rooms, ticket office, toilet rooms, hospital room and baggage room. On the second floor are the telegraph offices and sleeping apartments for night operators.

The wall up to the sill course of the first story windows is built of mountain boulders in cement; above this the walls are of face brick with black mortar joints. The roofs are of slate, and the gables are shingled. The interior is finished in red oak, with light open woodwork screens separating waiting rooms and offices.

The building cost $7,500 and was designed by A. H. Bieler, Baltimore, Md., architect of the Baltimore & Ohio.

TECHNICAL.

Car Heating Notes.

The Westinghouse Standard Return system and the Gold system are being tested on the Western New York & Pennsylvania—the former between Buffalo and Pittsburgh and the latter between Buffalo and Emporium.

Leather Belts.

In regard to the selection of belts for various kinds of machinery, an engineer has prepared, in general, the following advice as a result of considerable experience. Belts of a light color should be selected in preference to darker ones. Superior belting having an unmistakeable light buff color, indicates that it is oak tanned and that the leather has been thoroughly washed. This removes all matter except the fibre. The light color is an indication that only the best qualities of grease have been used. An inferior quality of grease not only impairs the quality of the leather, but darkens the color.

Power Brakes in India.

A railroad conference at Simala, in India, has under consideration the use of power brakes on those Indian railroads which still depend entirely upon the hand brake, located either on the engine or upon the brake van. Several more efficient brake systems are to be experimented with at Umballa.

Snow and Electric Railroads.

There are many people who although believers in the practicability of the electric railroad are yet skeptical as to its operation in localities where snow and ice are prevalent. The performance, however, of some of the lines operating the Thomson-Houston system during recent snow-storms has clearly proved that the snow and ice offer little, if any, opposition to their working. On Saturday, Jan. 20, there was a heavy fall of snow in Scranton, Pa., which at 9 P. M. had accumulated to the depth of about 6 in. On Sunday the cars made regular trips, which on that day are made hourly. On Monday morning it was found that there were many drifts, but they seemed to offer no impediment to the first car to go over the line, which plowed its way through them in a way which leaves no doubt as to the ability of these cars to operate in stormy weather. On the grades of 4¼ and 5 per cent. the snow was even deeper than on the level, but in spite of this the cars made their trips on schedule time. The operation of the cars was the subject of universal favorable comment. At Des Moines in the middle of December about a foot of snow fell, but it had no effect on the electric cars, which made their regular trips every fifteen minutes; in fact, the electric road was the only tramway in Des Moines which was able to operate on schedule time during the storm.

Preservation of Iron Against Rusting.

Mr. John Heald, a California engineer, in taking down a gas-holder, noticed that the plates, although very rusty, still retained the marks which they had when put up. This gave him the notion of using a mixture of white lead and turpentine to coat the iron. He found that by employing finely ground white lead dissolved in turpentine, the portions of metal covered with this preparation neither corroded or scaled. He thinks that ordinary paint, mixed with linseed oil, is too thick to penetrate all the pores and fissures of the metal, while white lead and turpentine, being very limpid, covers every part, isolating the metal completely from contact with air or water; paint only forming an apparent protecting coat, under which corrosion may occur.

The Michigan Iron Output.

The rail shipments from the Lake Superior iron mines for 1888 were the largest ever made, the total output for the year being 5,025,279 gross tons. Of this the Marquette range shipped 1,921,425, Gogebic 1,424,862, Menominee 1,161,639, Vermillion 511,953. The largest producers were the Minnesota Iron companies mines (Vermillion district), 457,341, and the Norrie (Gogebic) 412,196. The total output of all the mines since the discovery of ore has amounted to 40,811,861 tons, of which the Marquette range has shipped 2,713,419, Menominee 8,594,037, Gogebic 3,586,876, Vermillion 1,498,209 tons. The Lake Superior mine at Ishpeming has shipped the largest product, 4,435,356 tons, and the Cleveland, also at Ishpeming, produced 3,889,150 tons.

A STATION ON THE BALTIMORE & OHIO.

Electricity for Inclined Railroads.

An inclined railroad in Switzerland running up to a hotel on the mountains is operated by electricity supplied from a dynamo located over two and one-half miles away, at a water fall. The efficiency of this system is stated to be about 76 per cent. The decreasing cost of dynamos and motors and other electrical appliances will render possible in the early future many installations of this character.

Red Lead Joints.

Many engineers prefer to make the joints of steam and water pipes with red lead putty. If this putty is prepared in advance, it soon becomes stiff and hard, even though it has been covered with oil; so that when desired for use it must be worked up anew. This stiffening is due to the action of the oil on certain metallic salts contained in the red lead: the oil is oxidized, becomes resinous, and hardens the putty. If the material is prepared only when required, there is usually considerable waste. By mixing with the oil employed to make the putty, from 25 to 30 per cent. of heavy boghead oil free from tar or naphtha, the putty will remain fresh and plastic.

The Mouth of the Brazos.

Contracts for opening a deep water port at the mouth of the Brazos have been let. Active work will begin by April 1 or sooner.

The South Pass Jetties.

Mr. E. Y. Wisner has been at Port Eads for some two months, and now has the plant nearly ready to begin active work re-building the superstructure of the jetties.

Interlocking in Michigan.

State Railroad Commissioner J. T. Rich, of Michigan, has officially approved the Union Switch & Signal Co.'s interlocking and derailing switch, erected by the Michigan Central at its crossing with the Lake Shore & Michigan Southern in the city of Albion. The device is authorized for use on and after Feb. 11.

Manganese Steel.

The latest reports of experiments with manganese steel state that this material when properly made has a tensile strength of 120,000 lbs. per square inch, and an extension of 36 per cent. in lengths of 8 inches at the time of rupture.

Cast Steel Driving Wheel Centres.

Driving wheel centres made of cast steel will be used upon the Great Northern locomotives (England) during the coming year.

Pennsylvania Steel Co. at Sparrow's Point.

The Baltimore & Sparrow's Point Railroad, connecting Steelton, Md., with Baltimore, has been completed, and trains will soon be running. The Pennsylvania Steel Co.'s furnaces at that point are well under way, and one will be ready to blow in about April 1; another about two months later, and two more in a year.

An Electric Traveling Crane.

The first electric crane ever built in the United States has just been introduced in the foundry of E. P. Allis & Co. at Milwaukee. It weighs 30 tons, and will carry 25 tons. It is provided with three electric motors; one for transverse movement, one for movement lengthwise of the building and one for lifting.

Royal Trans-African Railway.

On the 31st of October the first section, consisting of 45 kilometres, of the Royal Trans-African Railway, from Loanda to Ambaca, was opened to the public. The inauguration ceremony was gone through in the presence of the whole commercial community and a great number of the native population, the religious portion, blessing the engine, etc. being undertaken by the vicar-general in the absence of the bishop. A train runs from Loanda daily over the open section, and the natives are already beginning to make use of it.

Logging Road in Alabama.

Mr. L. R. Kimball, of Mobile, Ala., writes us that he wishes to secure co-operation to build and equip five or ten miles of logging railroad within 10 miles of Mobile. He has about 20 square miles of pine lands available for logging or lumber.

THE SCRAP HEAP.

Notes.

The roundhouse of the Gulf, Colorado & Santa Fé, in Galveston, Tex., was burned on Jan. 6, and caused a loss of about $100 000. The fire was caused by a lamp explosion in the waste-room.

William E. Huston has received the contract for building the new station of the New York Central & Hudson River, at Lockport, N. Y., at his bid of $34 500. The station must be completed by Oct 1.

Mr. Pablo Maseulli, Government Railroad Commissioner of Chili, is in this country, and has been ordered by his government to make a general inspection of the railroads in this country for the purpose of gathering such information as may enable him to improve the railroads of Chili. He is also endeavoring to secure the establishment of a line of steamships between New York and South American ports.

An Application of Graphite.

The *Cosmos* says: "Persons who are annoyed by a creaking door, do not always have oil at hand, or do not care to use it, for fear of soiling the hands and the wood-work. But nearly every body carries a lead pencil. If the hinges are rubbed with the point of a pencil, the creaking will cease, graphite or plumbago being one of the best known lubricants."

Open-Hearth Steel at Pittsburgh.

Pittsburgh steel manufacturers have supplied open-hearth steel for nearly all of the war ships and cruisers constructed since 1887 and still in the course of construction. Within a period of less than two years they have supplied over 10,000 tons of finished material at an estimated cost of more than $1,200,000.—*American Manufacturer.*

A Belgian Railroad Disaster.

A terrible train accident occurred Feb. 3, near Groenendaal, Belgium. A train bound from Brussels for Namur struck a pillar of a bridge near that place, causing the bridge to fall. The train was carried down with it and completely wrecked. Fourteen persons were killed outright and 50 others were injured. Fifteen persons, all mortally injured, lie at Hoeylaert, near the scene of the disaster.

A Bridge Accident in Belgium.

On the 3d inst. there occurred at Groenendaal, in Belgium, a bridge wreck involving a serious train accident. From press dispatches it appears that a derailed train struck some portion of the bridge truss, causing a complete wreck of bridge and train. Fourteen persons were killed and 50 injured.

Consumption of Ties in France.

According to the *Moniteur Industriel* the six largest railroad companies in France consume more than 10,000 ties per day, or over 3 650,000 per annum. Since a tree of ordinary size can be made to yield, on an average, 10 ties, this means a daily consumption of 1,000 trees solely for this purpose. The yearly consumption of wooden ties in all countries is roughly placed at about 40,000,000. This figure, however, is, in all probability, much exceeded.

Apparently More Than the Traffic will Bear.

Austin & Co., a London firm, write as follows: On Dec. 11 we had forwarded to us by the Great Northern Railway, from Stockton-on-Tees, a sample cast-iron chair weighing 36 lbs., the charge for which was 4s. 1d., the value of the chair being under 1s. We protested against this charge as being excessive, but without success, the company informing us on the 3d inst. that the charge was quite correct, their rate being 1¼d. per lb., and the weight of the chair, according to their returns, was 39 lbs.—*Iron Trade Journal.*

Electric Street Railroads.

During the past week the Asheville Electric Street Railway, which has been in course of construction for the last month by the Sprague Electric Railway & Motor Co., of New York, was successfully put in operation. The first trial trip of the motor cars was made on Jan. 21, in presence of the President, Superintendent, and a number of prominent citizens, and about 60 others, some being stockholders in the road, and others interested in the success of the enterprise. The test proved a great success. The run was made over the entire distance of the line, about two miles, in less than eight minutes, carrying a large number of passengers.

The Plainfield, N. J., Common Council has decided to grant to Mr. Leo Daft the exclusive franchise for a street railroad in the city, and he will at once begin to build a street-car line to be operated by electricity on the storage-battery system.

A Westinghouse Engineering Society.

The young engineers of the associated Westinghouse interests in Pittsburgh, Pa., have organized themselves into a society for the purpose of studying electrical and steam engineering. L. W. Robinson, of the Westinghouse Electric Company, has been elected President.

Lloyds' Rules for Steel Ships.

It was in 1855 that Lloyds first issued rules for iron ship building, and in 1867 steel ships were first classed. The new rules just issued form a quarto volume of some 200 pages, with many tables for both iron and steel. The specification for iron is that it must be of a good malleable quality, capable of withstanding a tensile strain of 44,800 lbs. per sq. in. with the grain and 40,320 lbs. across the grain. Strips of steel cut crosswise or lengthwise of the plate are to have an ultimate tensile strength of not less than 62,720 lbs., with an elongation of at least 16 per cent. on a length of 8 in. before fracture. Strips are also to be heated to a low cherry red, and cooled in water of 82 degrees F., and then must stand bending double around a curve of which the diameter is not more than three times the thickness of plates tested. As to the relative sizes allowed, it may be stated generally that where the thickness of iron plates is defined in sixteenths of an inch, the thickness of steel plates is defined in twentieths of an inch; that is, when iron is $\frac{7}{16}$ of an inch steel may be $\frac{7}{20}$ of an inch thick.

RAILROAD GAZETTE

Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The committee on standard brake gear, appointed by the Master Car-Builders' Association, has had its first meeting at Altoona. This example of an early meeting is a good one to follow, and we sincerely hope that at the coming convention there will be little cause for repetition of the complaints made at previous meetings that the committees had not time to make their reports. The labor required in the preparation of presentable reports to the railroad conventions demands considerable time as well as effort, and it is not possible to make a satisfactory report when the time is limited to one or two weeks previous to the date of the convention. It is suggested that all those committees which have reports to make follow the example of the brake committee, and do all in their power to have their reports complete and satisfactory. The incomplete character of the reports and the criticisms made upon last year's work, as well as the excuses offered for the inefficiency of that work, is hardly creditable to the Association.

The response of the complainants in the car load rate cases seems less satisfactory than their earlier arguments. Without the original sheets of testimony we cannot follow them into all the details, but there seems to be a carelessness in some of the statements which is unfortunate. For instance, on page 23 the assumption that the percentages of coal east and west-bound are the same as those of other lines of business is entirely unwarranted by any facts which they present. Coming at the beginning of a long calculation it renders the whole useless. Again, we believe the statements about German practice to be materially wrong; so much so as to amount to a positive perversion of the facts. Wherever we have known anything about it, the amount of goods carried at the general car-load rate in Germany has been small, while the bulk of the car-load traffic has been carried under "special" and "exceptional" tariffs. Yet the existence of these latter classifications is entirely ignored, and in some cases positively denied. We shall hope to return to this phase of the subject hereafter.

A number of railroads in different parts of the country have adopted the policy of issuing stock instead of bonds to pay for improvements; but it is a somewhat novel thing when the Boston & Albany proposes to issue new stock as a means of taking up bonds at maturity. In a general way it is a good thing that railroad investment should be, as far as possible, in the form of stock. The stockholder exercises more immediate control over the management than the bondholder can. He is thus able to look out for himself, and take risks with his eyes open. Bonded debt ought, in theory, to be so small as to be subject to very little risk. The moment the margin of safety is approached, a conflict of interest arises between stockholders and bondholders; and the stockholders, having the board of directors under their more immediate control, are at an unfair advantage. We only regret that the substitution of stock for bonds should take place on those roads whose property is so secure that they need it least. In a general way, as has so clearly been pointed out by Mr. Wellington, the bonds should represent the assured value of the property, and the stock its speculative margin of possible value. But, in America at any rate, it is just those roads whose value is most purely speculative on which the stockholders have paid the least and the bondholders the most. A reform which would be of vast public importance west of the Mississippi makes much less difference in New England. But even here, we think it good as far as it goes.

Judge Brewer's refusal to interfere with the schedule of rates established by the Iowa Commissioners was not wholly unexpected. In an opinion recently published, on another case, he more than intimated that he had changed his mind on certain important points affecting the jurisdiction of the United States Courts in cases between railroads and state authorities. The effect on the stock market has not been so marked as some people expected. Investors are beginning to make up their minds that it is useless to expect the courts to resist the spirit of hostility to corporations which now prevails in many parts of the country. The people will insist on being taught some facts in railroad economy by sad experience, just as they learned the same lesson in 1874 and 1875. When the Supreme Court pronounced its decision in the Granger cases, upholding the constitutionality of the laws, the facts had developed to such a point that there was no danger of the most obnoxious laws being executed. It may be that the same thing will happen to-day. The alacrity with which several of the presidents have accepted the schedule of rates, looks as though they had made up their minds to let the people of Iowa have a full dose of their own medicine. The cessation of railroad development in the Upper Mississippi Valley would have a more potent effect in restraining hostile legislation than anything which the United States Courts could do, however strong their desire to protect corporate rights.

It is stated that the Burlington has been requested to discontinue its fast trains in order to allow the parallel roads to compete. Disregarding any consideration of the propriety of this request, the justice of it or the need of it, there is a point in railroad progress upon which it has a direct bearing, and in which all are interested. Those who have read or observed carefully in recent years, must be fully impressed with the fact that the Chicago, Burlington & Quincy is one of the progressive roads. While many roads have been paying but little attention to technical advancement or to the improvement of their permanent way and equipment, the Burlington has been hard at work to determine the most efficient, the most economical and the most desirable forms of locomotives and cars, and of bridges, tracks and stations. A large force of educated mechanics has been constantly on experimental work to investigate, by practical tests, the various details of railroad operation. We have published from time to time results of tests made with Chicago, Burlington & Quincy dynamometer cars—notably those made for the purpose of investigating the value of automatic brakes and the magnitude of train resistance and analyses from the chemical laboratories, notably those in regard to feed waters and the seasoning of timber, and also tests from the mechanical laboratory showing the comparative strength and wearing qualities of various kinds of material. Few roads in this country have devoted so much time and energy to the investigation of matters which affect safe and economical operation. Doubtless this road is now enabled to run its trains to better advantage than those roads which have not made such investigations. If for the sake of making things easier for its competitors the road is to forego certain of the advantages which its scientific enterprise gives it, the loss is not the company's only, but the public's. It is disadvantageous to the public that any railroad company should not be allowed to do the best it can to advance the public welfare. There is probably no road running out of Chicago which is better prepared for fast and heavy freight or passenger service than the Burlington. Recently it has been running some of its freight trains even faster than its passenger trains, and the locomotives hauling them are the very best express locomotives owned by the road. The operation of this road at high speed and with heavy trains has probably not increased the cost of transportation, or the loss of life or limb, and there seems to be no reason why it should not continue in its present course, as far as the public or itself is concerned. Other roads in the West, beside the Burlington, have been contemplating the purchase of dynamometer cars and other apparatus, necessary to the proper investigation of the best methods of design and operation, have extended their draughting rooms and laboratories, and have been endeavoring to put their experimental work on a scientific basis. There is, however, little encouragement for such improvements if the spirit evinced by some railroad officers at recent conventions is to be taken as a forecast of the manner in which knowledge derived from experiment is to be hampered in its practical application.

The Brotherhood of Locomotive Engineers seems to be somewhat disturbed by internal discussions—they can hardly be called dissensions. It was rumored a few weeks ago that Chief Arthur was to resign, and prominent members gave the story credence; now a Philadelphia dispatch state that the protracted burden of the Burlington strike has chilled the ardor of members in that region and that charters are likely to be surrendered. But Mr. Arthur, in an interview, talks as though he had no thought of resigning, and independent observers with facilities for getting correct information, say that the general feeling of the members is one of courage and strength, notwithstanding the expensive conflict just passed through. The general benefits of the organization are too substantial to be lightly abandoned, and the features that have proved to be of worth are too strong to succumb to a single blunder, even though it be such a great one as that on the Burlington. The *Locomotive Engineer* and the *National Car-Builder*, both of whose editors may be regarded as in a sense the champions of the engineers, though conservative and generally very reasonable ones, agree in attributing the Burlington blunder to the wrong policy of weakening the power of a cool and conservative head like Mr. Arthur, while placing additional authority in the hands of Grievance Committees. In the nature of things these committees cannot take the comprehensive view which a general officer, constantly studying the whole field, gets, and there is in addition the constant danger of committee-men being warped by their vanity or ambition where they see that a strike may advance their apparent personal interests. That there were prominent members who were thus unduly prejudiced seem now to be generally admitted.

The promoters of the "Brotherhood of Railway Conductors," a new organization intended to compete with or supplant the "Order of Railway Conductors," aver that the corner stone of their society is their sympathy with the striking brakemen of the California Southern, who last Fall objected to the promotion of freight brakemen to be conductors except on the seniority rule. Young or new conductors were promoted over older ones simply because it was believed that they were better qualified. This the old men could not stand. While this strike was an unreasonable one, superintendents will do well to take note of it and of the best methods of preventing such in the future. The manager in this case no doubt honestly aimed to serve his company in the best manner possible, and trainmen will have to admit that it is somewhat presumptuous for them to interfere with such a purpose in a matter of this kind. But the way to promote young men over old ones and to do it without friction is to keep a record of every man's conduct and standing, and thus afford each individual some opportunity to know beforehand what he may expect for himself as compared with his fellow employés who are competitors with him. Dull minds or careless habits counteract the benefit of an ancient record on the pay roll. Men who can gather more experience of real value in two years than others can in five, *must* be given the preference, to a certain extent, if the superintendent is going to do justice to the stockholders. But the grounds on which promotions are made should be stated as fully as possible, so that men can have a clear idea of them constantly, and (unless they are wilfully blind) not be so painfully surprised when a number of promotions are suddenly announced. When it is said that (1) long service, (2) faithfulness and (3) capacity will entitle employés to promotion, short-sighted ones give too much weight to the first and second points, and too little to the third, and thus prepare themselves for disappointment. To prevent this disappointment and the consequent dissatisfaction, which is regrettable, even if it does not culminate in a strike, explain the relations of things more fully. If capacity counts 45, faithfulness 45, and length of service only 10, in making up the 100 points necessary to advance a man,

let him know the fact in good season. Judicious counsel of this kind would return to the superintendent giving it, in an increased number of ambitious men who would be constantly improving themselves.

One of the roads referred to in our article of Jan. 11 (p. 28), on the value of the block system on roads of medium traffic, was the Wabash. Since the publication of that article we have received from a correspondent on that road some particulars which will be of interest, and which we therefore summarize, as follows:

"The Wabash has operated the absolute block system on the section of single track between Decatur and Bement, a distance of 20 miles, for a period of 16 months, the traffic being from 30 to 60 trains per day; and during that period there have been no accidents, although trains of two divisions are running over the track, and there is more liability of having trouble under these conditions. The distances between telegraph stations are as follows: Decatur to East Decatur, 1 mile; East Decatur to Sangamon, 4 miles; Sangamon to Oakley, 2.7 miles; Oakley to Cerro Gordo, 4.1 miles; Cerro Gordo to Milmine, 4.3, and Milmine to Bement, 4.4 miles. Each station is provided with a day and a night operator; the day operators are also station agents. The mode of procedure is similar to that on the Canadian Pacific and other roads, as heretofore described in the *Railroad Gazette;* that is, as soon as a train has passed a telegraph station the telegraph signal is displayed *red*, and is not changed to *white* until the operator at the next station reports that the rear of the train has passed his office. If a following train arrives while the signal stands at *red* it is held until proper release is given.

The extra expense incurred in consequence of the use of this system amounts to $135 per month, the salaries of three additional night operators. The Wabash has established a few additional night telegraph stations on other parts of the line, and is operating the block system to some extent on all parts of the road. The dispatchers have instructions to the effect that when the weather is stormy or foggy they must block trains a telegraph station apart, and this rule is also followed, on very crooked portions of the road, in clear weather. Where the track is reasonably straight and the weather clear trains are allowed to follow in accordance with the ordinary rules, but the rule not to allow a freight train to follow a passenger train until the latter has passed the next telegraph station is enforced as fully as possible on all portions of the road and at all times, but especially in stormy weather. The total increase in expense incident to carrying out this arrangement is about $400 per month, including the line between Decatur and Bement."

General Superintendent K. H. Wade and his assistant, G. W. Stevens, speak warmly in favor of the system, and regard the additional expenditure as money well spent. As both of these gentlemen have had long experience in the telegraph department and as dispatchers, their views are of exceptional weight. Apparently the only reason that they do not put the system permanently in operation on all parts of their road is their hesitancy about incurring so marked an increase of expenses in too short a time.

Two Sides of the Rate Question.

Two important documents on the railroad situation, have appeared at almost exactly the same time. One was the opinion of the Inter-state Commerce Commission in the matter of passenger rate wars; the other the report of the General Manager of the Illinois Central on the reasons which led to a reduction of dividend. The subjects dealt with in the two are more nearly the same than their titles would lead one to suppose. The Commission, in dealing with the irregularities of passenger agents, is led to inquire into the general causes and effects of rate wars. The Illinois Central, in explaining its loss of revenue, is led to do the same thing. It is hardly necessary for us to say that the conclusions arrived at are somewhat different in the two cases.

The Commission holds, first, that the losses from meeting cut rates were greater than could have resulted from maintaining established ones; and, second the action of the railroad companies involved a wanton sacrifice of stockholders' interests.

"Judging from the facts before us, there would seem to be no avoiding the conclusion that the dictates of reasonable prudence were disregarded by every one of the carriers that met the cut rates. The losses from meeting them, if the other reductions were made which an observance of the act to regulate commerce would render necessary, must have been much greater than any which would have been at all likely to result from maintaining the previous rates. But this is not all: it was perfectly apparent from the first that the only effectual and permanent remedy that the parties could have for the difficulty which had arisen was to come to a better understanding, and a prudent regard to their own interest would have dictated that the steps taken should have been chosen from their probable tendency to bring it about. Hostile and retaliatory action naturally led in the other direction. It is not for a moment to be conceded that any one of the carriers involved in this controversy acted under any such compulsion as their agents now bring forward in order to excuse themselves. The imperative necessity under which they claim to have acted was matter of pure assumption."

It may, perhaps, be urged that it is unfair to quote the words of the Commission with regard to a particular war of rates (and a passenger rate war, at that), and apply them to the general subject. We can only say that the Commission itself invites this application. It extends the principles underlying this opinion to "all cases where arrangements are broken up under which parties have been competing for business with maintenance of reasonable and steady rates."

Of the roads affected by the western rate wars, the Illinois Central was among the least aggressive. This was partly due to its situation, and partly to the tradition and character of its management. It says in its own report:

"Through all these trying times the Illinois Central Company has pursued a conservative course. It has obeyed the law since its inception. It has endeavored to exert a restraining influence upon all its neighbors and competitors. It has co-operated with all conservative managers for the preservation of rates and the securing of greater revenue. The Illinois Central, where it was compelled to do so to preserve a share of the business it has carried to trade centres reached by it for many years, has accepted the low rates made by its competitors. In no instance has it been the aggressor. The losses the company sustained have been forced upon it by the aggressive or reckless competition of others, who, by their course, sustained proportionately much greater losses than those of this company."

What is still more convincing, the Commission bears out the same view. In the opinion before us it "commends the Illinois Central for its firmness" in resisting local appeals, and says: "The matter with the Illinois Central was that it was doing exactly what it ought to do when it thus stood 'idly by,' and declined to take part in a disreputable struggle. It was not responsible for the injury which any town might suffer by reason of the misconduct of others." The statements of Mr. Jeffery are therefore not to be discounted as containing necessary apologies for his own conduct, but may be regarded as giving a fair inside view of the situation.

The first point in which he dissents from the views of the Commission is with regard to the wanton character of rate wars. Speaking of the disastrous war in the Northwest, he says:

"The Chicago, Burlington & Northern Railroad was constructed to move, at low cost, through traffic, and it commands comparatively a small local business. The low through rates it established and held between Chicago and St. Paul could not affect it locally to the extent that the older and stronger lines, with large local traffic, were affected when meeting its low through rates. As these older lines could not afford to carry traffic to and from their local stations at the low rates charged by the Chicago, Burlington & Northern, for the longer distance between Chicago and St. Paul, and, as they could not induce the latter road to advance its rates to remunerative figures, they relinquished, for a time, the St. Paul, Minneapolis and other through low rate traffic. *After a fair trial of this policy, the lines interested became dissatisfied and restive. They felt their losses were too great in giving up the through traffic.* Two of them, therefore, established the same rates between Chicago and St. Paul as were in effect by the Chicago, Burlington & Northern, but retained the higher rates at their intermediate local stations. This course they thought the Inter-state Commerce Commission would justify. A hearing of the case was had at Dubuque, and resulted in a complete failure for the lines in interest. The Commission refused to sustain them."

If this is a fair statement of history—and, on the whole, we think it is—it relieves the managers from the charge of wanton recklessness in trying to save their through traffic. If the loss of such traffic was a most serious matter to their roads, they are not open to sweeping charges of bad faith in trying to save it, even though the results may have proved bad in the end. But we are ready to go one step further in their defense. Bad though the results may be at present, we are not disposed to believe that the course recommended by the Commission would have done any better. We believe that, under existing circumstances, the reckless road has it in its power to dictate the course of its rivals. The Illinois Central protested with all its might against the action of the Wabash in reducing Illinois rates; but it could do nothing more. To quote again from Mr. Jeffery: "The action protested against resulted in a general reduction of rates to and from Chicago throughout our Illinois system. This we were utterly powerless to prevent. We had to accept the lower rates or go out of business."

But where is the fallacy in the theory of the Commission that the losses from meeting cut rates are greater than from losing competitive traffic? If we take the state of things when a rate war is far advanced, we find that the goods are carried for prices which hardly pay train expenses. A much smaller traffic at the original rates would pay better than this. Looked at in this point of view, the argument of the Commission seems strong. But it ignores some essential elements in the case.

The road which is the aggressor does not make these reductions all at once. It makes its rates, especially those on through traffic, a very little lower than its rival. If the latter does not meet the cut it loses a profitable traffic which its opponent gains. The gain to the road whose cut is not met is the most certain thing in the whole transaction. There is hardly any point, however low, where it will not pay a road to make a little further reduction, if it can thereby get the whole or nearly the whole competitive traffic instead of only one half.

This is the form in which the problem faces the railroad managers. They do not and cannot foresee how far a war will go and how long it will last; but they do see that a slight difference in rates involves much gain to their competitor and much loss to themselves. They therefore feel the necessity of meeting a cut. The stability or instability of rates is like the stability or instability in most problems of physical equilibrium—determined by differential equations rather than by aggregate results.

A pool avoided some of this instability, because it took away the necessity of meeting a cut at once. It made it possible for the railroads to be prudent and deliberate in their action, instead of seeing their traffic at the mercy of the most reckless agent of the most bellicose line. Opinions differ as to the merits of pooling: it was at any rate much better than nothing. "The old and tried methods, imperfect though they were for maintaining rates and revenues, were legislated out of existence." What was given in their place? An appeal to the Inter-state Commerce Commission? How little protection could be had from that quarter was seen by their decision in the matter of the Chicago, St. Paul & Kansas City. If a rival road suddenly introduced a sweeping cut, with all the worst abuses, the Commission would doubtless interfere: but an ordinary difference of method, which might be sufficient to divert a large part of the traffic, would hardly be recognized by that body as furnishing a case for action. If the Commission did anything the results would be accomplished so slowly that it would be like shutting the stable door after the horse was stolen.

Under the circumstances, we believe that the only available check upon rate cutting is the knowledge that a cut rate will be met. We dislike to say so, for it is an intolerably bad state of things when such is the case. But it is better to face the facts than to preach peace when there is no peace. If police arrangements are totally inadequate, honest men must carry weapons.

Electric Lighting on Railroad Trains.

The various experiments which have been recently made in lighting trains by electricty show that there is a lively interest in and an increasing demand for this method of lighting. Its advantages are apparent by a single comparison of a car lighted in this manner with one lighted in any other way Two things are, however, essential to its extensive adoption: (1) It must be practicable to light trains on a large scale, and to maintain the system in good order without expert assistance. The apparatus must must be so simple that it can be safely put in the hands of mechanics of ordinary ability, and so durable that it will not often need repairs. (2) The cost must be reasonable compared with other methods of lighting, and the character of the train.

Thus far attention has been principally confined to the first of these two requisites, that of obtaining a satisfactory light by a simple and reliable method, but not yet, it must be said, with such complete success as is desirable.

There are but two methods which have been tried with any considerable success in this country. One is by the use of storage batteries charged at the ends of the line, and sometimes at intermediate points, also. The other is by an engine and dynamo in the baggage car, the engine run by steam from the locomotive and supplemented by storage batteries under each car. At present it appears as if it was in this latter direction that we must look for the practical solution of the problem. Trains lighted in this manner have now been running for about a year on the Pennsylvania, and several are in use elsewhere, particularly in the West.

The first train in America to be lighted throughout by electricity was run from Boston to New York on the Boston & Albany, March 30, 1887. The first electrically lighted train in Canada ran from Montreal to

Ottawa, Nov. 2 of the same year. These were lighted by the Julien storage battery. Those who are impatient at the imperfection of the results yet attained should consider how short the time has been in which to overcome the many difficulties incident to a new experiment of this kind.

The cost, per car, of fitting up trains for the storage system would be fairly estimated as follows:

	Per car.
Fifty cells storage battery, say	$600
Wires and switch-boards	50
Boxes and trays for the batteries	50
Twenty-four lamps, sockets and shades	48
Total	$748

or for a train of 8 cars, $5,984.

This would equip the cars to give 10 or 12 hours of lighting with once charging of the batteries. If there were facilities for charging the batteries after every six hours of actual lighting, the cars might be equipped for $448 each. An estimate by the Electrical Accumulator Co. in 1887 for a car fitted with 15 lamps, battery of 24 cells, etc., was $375. The operating expenses per 10 hours may be estimated as follows:

Charging the batteries, 8 cars, say	$12.00
Wages, superintendance, etc.	3.00
Interest on $5,984 at 5 per cent.; depreciation and repairs on batteries, say 25 per cent.; depreciation of lamps, etc., 10 per cent	1.27
	$16.27

This equals $1.63 per hour for 8 cars, or about 20 cents per car per hour, and 0.85 cents per lamp per hour. If electric lighting were in extensive use or with longer experience, it is probable that this cost would be somewhat reduced.

Where a dynamo is used in connection with storage batteries, the latter are so arranged for each car that when the dynamo is running and the lamps are not lighted or the whole current of the dynamo is not required for the lamps then burning, the batteries are being charged. When the dynamo is stopped, or does not supply current enough for the lamps, the lighting is maintained by the batteries, which are of sufficient capacity to run the lamps for 5 or 6 hours. A late improvement in the first applications of this method, is the addition of a set of indicators at the dynamo, so that the attendant may know how much current each battery or each set of lamps is using, and can instantly detect a short circuit or other defect in the lines. Another device maintains a constant current to the lamps.

The steam which runs the engines in the baggage car can be and sometimes is afterwards used for heating the train, although it somewhat reduces the efficiency of the dynamo for the lighting.

The cost of fitting a train in this manner with 24 lamps per car has been given in a recent example as about $5,500 for 8 cars, or $687.50 per car. This system requires a competent electrician for every train, which adds considerably to the cost of maintenance. Estimating the cost, as in the former case, and assuming that 192 lamps require 20 horse-power, we have a yearly cost as follows:

Fuel	$700
Five per cent. interest on $5,500	275
Depreciation of storage batteries, 25 per cent. of $2,500	600
Ten per cent. depreciation on remainder of plant, $3,100	310
Attendance	1,095
Total for eight cars	$2,980

The cost per day, therefore, is about $8 for eight cars. If the lamps burn an average of 6 hours per day, the lighting would cost about 16⅔c. per car per hour, or 0.69c. per lamp per hour. As in the former case, extensive use or longer experience with this method of lighting will almost certainly reduce the cost, as given above, but, even at these rates, considering the amount of light obtained, the cost would not be prohibitory, though far in excess of that for lighting buildings with incandescent lamps.

Recently the Chicago, Milwaukee & St. Paul has fitted out two trains, running out of Chicago, with electric lights. These lights were put in by a firm in Chicago, which has arranged them under an improved system. The location of the lights in the car is far more satisfactory than when placed in the usual position. One is placed in each partition between the two lower berths in such a manner that passengers can read while lying in their berths, these lights being so arranged that a curtain can be drawn to screen the light when desired. Persons desiring to read until a late hour can do so without disturbing other passengers by reason of these lights at their backs in the small panel dividing the two berths. Other lights are placed at the corner between the monitor roof and the main roof of the car in such position that those in the upper berths can easily see to read or attend to the details of their toilet. The kind of engine most used is the Brotherhood, three-cylinder; the Ide Engine Co. is making a horizontal, and the Castle Engine Co. a vertical engine for this work. The steam pressure used has been, so far, about 80 lbs., a reducing valve being placed upon the locomotive to keep the pressure as uniform as possible.

On all the questions connected with lighting trains by electricity, it is proper to "Report progress and ask for more time."

A Word About Metal Ties.

The use of metal ties, even as an experiment, has hardly begun in this country, and it does not seem probable that they will be greatly used here for many years to come. While the relative cost of wooden and metal ties remains near what it now is, the convenience of the wooden tie in track work and the admirably elastic bed which it makes, will cause it to be generally used. We may expect also that the life of wooden ties will be further increased, and the cost of maintenance reduced by the use of metal tie plates of improved forms and probably by better and cheaper methods of preservative treatment of the timber. We look to see both these expedients well tried and exhausted before the metal tie comes into great use.

Still, the question of the possible economy of steel or iron ties, even at present prices, is an attractive one to many engineers of inquiring and progressive temperaments, and many ties have been designed, some by railroad engineers thoroughly familiar with the conditions to be met and with the experience of European and Indian roads, and some by young men and women whose imaginations were absolutely unfettered by practical knowledge. As a matter of interest we have from time to time illustrated some of those ties which have been most carefully designed and have reached the widest use; among these are the tie gradually perfected by Mr. Post, of the Dutch State railroads, and the London & Northwestern tie. Last December we showed also what appears to be a pretty well designed metal tie which is to be tried on the New York Central & Hudson River. Some week ago the *Engineering and Mining Journal* was led to "illustrate the principle types of metal ties already designed, and enumerate their defects from a manager's standpoint." For that purpose it selected four ties, now widely used, and several which are still untried, including those mentioned above. Unfortunately for the outcome of this laudable attempt to "enumerate their defects from a manager's standpoint," the writer of the article started out with the very obvious purpose of showing that a composite tie made of an inverted channel, with blocks of wood under the rails, and the bottom of the channel cut out in the middle, is superior to all other forms, although it is still practically untried.

The ties now in successful use are essentially channels, with the flanges placed downward so as to inclose a considerable prism of ballast between them and, except in the case of the London & Northwestern tie, with the ends flanged down also to increase the resistance to lateral movement. The writer in the columns of our contemporary criticises all these as being likely to break, or at least bend down at the middle, because they take a bearing on the more compact ballast there. In reply to this it may be said that some months ago Mr. Post reported that out of many thousands of his ties, some of them in use since 1881, not one had been replaced, and of 10,000 of a similar type, but inferior in details, 9,550 were in use in 1887, after 22 years' service. Further, the London & Northwestern ties in use on the Pennsylvania do not bind down, although our contemporary demonstrates that they ought to. One sufficient reason for this illogical behavior of the ties is that, contrary to the belief of the writer from "a manager's standpoint," particular pains is generally taken to tamp the ballast hardest at the ends and under the rails and more lightly in the middle of the track, expressly to prevent rocking of the ties. We mention this familar fact, not for the instruction of our readers in general, but for the information of our contemporary.

Another criticism brought against the most common type of tie, that in which the channel is placed with the flanges down and in which the ends are bent down, is that it lacks lateral stability. This criticism is also based on the assumption that the ballast is loose at the ends of the ties and compact in the middle, and obviously falls with that assumption. The *Engineering and Mining Journal* says that "if, as illustrated in the *Gazette*, the ballast of the roadbed has a width of 13 ft., the solid portion would probably extend to meet the spoon ends, and the resistance would be very good; but unfortunately it is only in print and *illustration*, where stone ballast *costs nothing*, that roadbeds are ever made so wide: in *reality* the ballasting very rarely extends beyond the ends of the ties." The italics are our contemporary's. We have before us at this moment drawings of the standard roadbed of seven roads, of which three are trunk lines, and three are among the most important Western lines. On these the width over the ballast varies from 13 ft. to 20 ft. for single track and from 26 ft. to 33 ft. for double track. These are not selected examples, but doubtless one can find instances on roads of less traffic where less width of ballast is used. On these seven roads, at least, the resistance to lateral displacement of the channel tie with end bent down would, according to the authority quoted, be "very good." We understand that the London & Northwestern tie with the ends open does not hold well in line on the Pennsylvania.

In the article to which our contemporary has given two pages and a quarter of its valuable space there are various other comments and suggestions, but the value of most of them is sufficiently indicated by those which we have considered. We cannot well follow the writer further in his effort to present ground principles from a manager's standpoint without appearing to advocate the patent of one man or to attack that of another, and, indeed, it is hardly worth while.

Highway Crossings in Massachusetts.

The Railroad Commissioners of Massachusetts have heretofore called attention to defects in the Massachusetts law regarding railroad crossings of highways at grade, and have shown with great effect the serious losses of life which occur at such crossings, and the immense difficulty of arriving at any proper and adequate basis for a law to do away with them.

Last year a special commission was appointed by the legislature to investigate the subject, and that commission has just made its report. The commissioners are A. W. Locke, W. O. Webber, and G. A. Kimball, all civil engineers, and their report is accompanied by details of special examinations and surveys. Those details we have not yet seen, but the general features of the report are published.

The first fact which strikes one is that the cost of separating the grades of some 2,260 crossings is estimated at $48,131,000 and this is the key to the whole situation. There is little question in the minds of either railroad officers or the public that highway crossings at grade are a most serious source of danger and expense to the public and to the roads, and should be done away with; but who is to pay for it? The estimated cost of the work in Massachusetts amounts to nearly one-third of the aggregate capital stock of the 60 corporations which made returns to the Railroad Commissioners of that state in 1887, and is nearly 90 per cent. of their gross income for that year. It is about six and one-half times as much as those corporations paid in dividends in 1887. It is obvious that it is impracticable for the roads to assume such an immense burden, even giving them the greatest practicable time in which to do the work.

The commission which has just reported to the Massachusetts legislature indicates that the process must in the nature of things be slow, and suggests that a law should be enacted requiring the abolition of highway crossings at grade, but providing that its operation should extend over a number of years. In fact, it is recommended that the dividend paying roads abolish 5 per cent. and the non-dividend paying roads 2½ per cent. of their crossings every year. In order that the work shall not be confined at first to that which can be done at least cost, it is recommended that these percentages shall be reckoned on the total expenditure to be made by each road and not on the number of its crossings.

The commission makes no definite recommendation as to the method by which the proposed law is to be enforced, but suggests that there should be some permanent central authority charged with this duty. It is sufficiently obvious that some such provision is necessary.

The hard part of the problem, the apportionment of the cost, the Commission also leaves to the wisdom and ingenuity of the law makers, with the suggestion that the expense should be borne by the railroads, the street railroads, the counties, cities and towns, and the adjacent properties benefited. It is not thought that the state should assume any of the burden. On the whole this is perhaps the best that can be done. It is a safe principle that the communities and property most immediately benefited by the expenditure should pay for it. On the other hand the work is one of general usefulness and benefit. Whatever facilitates the operations of the railroads is as a rule of benefit to the state at large, and cer-

tainly measures that will permit trains to run at greater speed and with more economy, through one town or county, will very often be of more financial advantage to its neighbors than to that community. The injustice of such cases will be mitigated by assessing a part of the cost on the county instead of the town, but even then the burden will often be badly distributed. The natural reluctance of every community to assume new burdens of taxation has retarded the work of separation of grades which might perfectly well be done under existing laws, and the act now proposed can only be effective by taking not only the initiation of the work but the assessment for it out of the hands of the local authorities.

It is a well known fact that under the present laws of Massachusetts there is provision for the separation of grades at crossings by which the cost shall be apportioned between the railroad and the city, town or county, but the reluctance of the parties to pay their part of the cost has restricted the number of petitions. The commissioners, whose report we are now considering, propose, as we have said, to put the work under state authority, but to restrict the tax which may be imposed upon communities to some fixed percentage of their assessable property valuation. It is not proposed to fix by law the proportion that each party should pay, but to leave each case to be decided on its own merits.

It is suggested further that the railroads should be allowed to issue new stock to pay for these improvements, which constitute an actual addition to the property.

A very essential feature of legislation to do away with highway crossings must be the prevention of new ones, as is shown by the fact that while 75 such crossings were abolished in Massachusetts in 10 years to Jan. 1, 1889, 155 new ones were made. In states which are now pretty well supplied with railroads it would seem as if public interest would be served by putting very vigorous restrictions on new grade crossings.

Altogether, the problem which the Massachusetts Legislature has attacked is a very complicated one, but it is one the difficulties of which grow fast, and which can be more cheaply settled now than in the future. It seems likely to be intelligently acted upon in Massachusetts, and with careful regard for all interests. Perhaps the example of Massachusetts will be encouraging and instructive to other states. New Jersey particularly should take action in this matter. It is probable that there is no other state in the Union in which the deaths and injuries at highway crossings are as numerous as they are in New Jersey, notwithstanding the use of gates at all of the most important crossings.

Inspection and Instruction of Trainmen.

The publication, in recent numbers of the *Railroad Gazette*, of accounts of the practice of the Savannah, Florida & Western in the matter of inspection and instruction of trainmen, has called out a number of inquiries concerning the details of the work described, and we give here a few additional particulars. The number of trainmen on that road is not large compared with the extent of the system, the road running for long distances through a thinly settled country. The plan of inspection, therefore, has not been laid out so elaborately as might be found necessary on a larger road, or one having a denser traffic. The original order announcing the introduction of the system is as follows:

"On and after..... ...there will be appointed an Inspector and Instructor of Train Service.

"The Inspector and Instructor of Train Service will be expected to inspect the manner in which train employés discharge their duties and comply with the rules of the company, and report all irregularities in these respects that may come to his notice. He will instruct any train employés that may seem to him to be deficient in the knowledge of what is expected of them.

"The Inspector and Instructor of Train Service will make daily reports to the Assistant Superintendent of his movements and of any neglect or violation of any of the rules of the company by any train employé.

"The position of Inspector and Instructor of Train Service will be filled in turn for periods of one calendar month by each first class conductor, beginning with conductor.. ..... who will begin the service on.....next."

The form of daily report to be made by the inspector to the assistant superintendent is as follows:

I have this day inspected.....train No.....running between..... .....and.....conductor.....engine No..... engineer .....and found the equipment of this train in the following condition.....

.....

Is the conductor familiar with the rules governing the receiving and discharging of freight at regular and flag stations?

Answer.....

Does he comply strictly with all rules?

Answer.....

Does he report cars, as provided for by the Master of Transportation, on the line of road?

Answer.....

Is he pleasant and courteous to passengers and patrons of the road?

Answer.....

Was way freight properly loaded? If not explain cause, also delay, if any ....

....

Give any other information not provided for herein.....

....

I have been between.....and..... ...to-day on train No. .....and will to-morrow go to.....

It will be seen that this is very general in its terms, and leaves room for much discretion on the part of the inspectors. In point of fact, the blank spaces for answers to the questions must, of course, often require one or two pages, or more. This strikingly suggests the general character of the work. The subjects on which the inspector must report are, of course, of the most varied character, and may be embraced under such a variety of heads that anything like a preliminary classification or a fixed form is difficult to make. This is especially the case where the standard of efficiency is already high. With a set of men of very loose habits in their work, a limited number of columns in a blank would suffice to record their standing and give a clear view of the treatment necessary to be applied; but to write out suggestions for the improvement of men who are already above the average is by no means so simple a task, and the use of a form is comparatively unimportant. All this, however, refers especially to *inspection*. For systematic *instruction* of the men in their duties, as in train rules, for instance, a form is important for the purpose of securing uniformity. Quite elaborate forms for this purpose are used, as our readers will remember, by the Fall Brook Coal Co., the Chicago, Burlington & Northern, the Louisville & Nashville and other roads. But the Savannah, Florida & Western appears not to have specially taken up this branch of the subject. Its system of promoting men has been quite strict for several years, and the need of elaborate special instruction is probably not regarded as particularly urgent just now.

A correspondent has criticised the plan of "rotation in office," as practiced on the Savannah, Florida & Western. This criticism is substantially just, as the best service cannot be had in any office except by giving the incumbent sufficient permanency to enable him to cultivate a strong enthusiasm for his work. But on the road in question the conductor, temporarily invested with a monitorship, doubtless acts largely as a special agent for the assistant superintendent, who keeps close track of the service himself. On a larger system, or where the superintendent is already overworked, and must, therefore, in delegating a work of this kind delegate more or less of the authority, as well as the detail, a permanent inspector would be more essential.

The officers of the Savannah, Florida & Western report increasing satisfaction with their system and now regard it as one of the necessary departments of the road. It is found easy to keep a good record of every man's standard of competency, and to have accurate knowledge of the extent to which rules are lived up to. Keeping a check on slight departures from the rules, which ordinarily would not be discovered until they had become worse and resulted in some mishap, is found to be decidedly beneficial.

The vital point with any superintendent, in considering any phase of this general subject is to make a start and do *something*, if he has not already taken action. A little study of the matter will convince him that any of the methods thus far described in these columns will do to begin with, and will no doubt use up all the money he can make available for the purpose at first. He will have no difficulty in finding ways to enlarge his operations as fast as he can get the directors to give him the funds. Although the systems of the roads above mentioned are characterized as "elaborate," they are by no means excessively or unnecessarily so. One of the largest roads, which has already done some of the most careful work in this line, and on a large scale, is preparing to go still more carefully into details, and to define the relations between the men and the officers better than has ever been done before.

Disposition of Old Records.

The constantly increasing accumulation of books and papers in the offices of any large road becomes in the course of years, without an intelligent system of arrangement, an unwieldy mass of material from which it is difficult to extract any information. With the best of care such accumulations are difficult to preserve in good shape; but the difficulty of handling them is much augmented by the careless way in which bundles of old papers or piles of books are often tucked away upon shelves or into vaults without any adequate indication as to whence they came or to what department they belonged. These collections often amount to numbers of tons, and even with the most ample storage facilities the demand for increased room becomes imperative.

In order to provide for the proper care of this class of material, two things should be carefully looked after when storing and arranging it. The first is that all papers which have outlived their usefulness should be promptly disposed of by sale or in some other way. In the second place such papers as are valuable enough to be kept should be stored in such shape that they will be safe from fire, dirt or dampness, and labeled or catalogued in such manner that they can readily be referred to. It is true that such arranging takes a little time and expense, but it is more than made up by the saving in time when some particular paper or book is being sought for.

There are upon different roads different policies in regard to the time that the various classes of papers shall be held before being destroyed or disposed of. As a rule, it may be conceded that all contracts and agreements, together with all books and records relating to the organization, history and general accounts of the company, should be preserved with the greatest care, as should all vouchers, pay-rolls and other evidences of money paid out, when the question of such payment might be brought up in the future. All original letters and impressions of letters sent should be preserved, as they will, as a rule, give the full history of any transaction. Other classes of material which relate chiefly to the detail of collecting the company's revenue, such as station abstract books, the tissues of joint billing, the freight expense and way bills and many other forms can safely be destroyed after a few years, say five or six, when there is no longer any chance of their being needed to refer to in any possible claims against the company. Other papers and books, like old shorthand books, pass stubs, ordinary telegrams and the numerous papers that accumulate each year in any office may, as a rule, be made away with after they have been kept on hand a year, and the quantity of miscellaneous reports, statistics and papers of this character is very large. Statistics and reports that have been received by different offices may, as a rule, be safely destroyed if the office in which they originated keeps, as it should do, complete files. It is usually much easier to go to the original office for information than to hunt over the files of the receiving office after years have elapsed.

When we have decided to do away with old papers that have accumulated, the question arises as to the best method of disposing of them. As a rule it is better to put such material into the waste paper, as the sum so received, though small compared with the original cost, is not to be despised. Any papers with which there is danger of misuse if in improper hands, may be burned or ground up so that their identification will be entirely lost. We have seen a little electric motor running a set of revolving knives which occupies but little room in one corner of an office, and which grinds, or rather cuts, papers passed through the knives into small shreds, which form excellent paper-making material. Cancelled tickets, station remittance sheets, old checks, drafts or paid pay roll checks, are all good material to dispose of in this manner.

If once a year a clearing up was made by each department or office and the antiquated and useless books and papers sorted out by some competent person, it would be surprising as a rule to see how large a quantity of material would be eliminated; and how much more easily the balance could be arranged and classified. To repeat a little, it may be laid down as a general rule that all papers and books that have been used are either worth preserving or they are not. If they are worth keeping they should be properly cared for. If they are only fit for the waste paper pile the sooner they are put into it the better. Their room is saved for something useful, and as a rule neatness is much increased by their disposal, and the damage from dirt and chance of loss by fire much diminished.

At a late meeting of the Freight Committee of the Central Traffic Association, Chairman Blanchard suspended his circular which stated that all bills of lading not consigned "to order" should be stamped with the words "not negotiable." The reports do not give very clearly the reasons for this suspension. Counsel for lines in New York state said that the circular was opposed to the statutes of that state. It would seem that they were in error. In 1859 the New York Legislature passed a law making a warehouseman liable if he delivered property without surrender of the warehouse receipt. An amendment made this applicable also to bills of lading, but a provisional paragraph limited both sections by saying that they should not apply when the warehouse receipt or bill of lading contained the words "not negotiable." This, it will be noticed, completely sustains Mr. Blanchard's position. Something of the kind is needed. Should it so happen that a bill of lading made out simply to John Jones & Co. should be handed to a banker as evidence of ownership and as collateral for a loan, and should the railroad in ignorance of such hypothecation deliver the goods to the straight consignee, John Jones & Co., the carrier may be held for the value unless the receipt or bill of lading reads, "not negotiable." The theory is that the law will always protect the innocent holder of any collateral. Not a very high opinion is held of any bank which will accept such a straight bill of lading on a loan, without taking every precaution to secure title to the property by notifying the carrier; nevertheless it is sometimes done. The objection of other counsel that no steps should be taken to interfere with the usual commercial procedure, is better founded. But even here, something is due the carrier, who seems to be running a great and really unnecessary risk. Certainly the railroad should be held harmless for delivering a straight shipment to the consignee without surrender of receipt or bill of lading. This might be accomplished by requiring notice of assignment to be filed with carrier before delivery; or by Mr. Blanchard's plan of stamping on the words "not negotiable." Merchants would soon learn to take out a bill of lading "to order," if there was a possible need of hypothecating it.

The present lease of the Union Depot at St. Louis expires next month, and in the discussion about new arrangements, —which discussion, by the way, is of very little use, as the Missouri Pacific has a controlling interest in the property— the statement is put forth that "the public demand for Union depot facilities has declined of late years." Merchants and hotel keepers desire separate stations for each road, so that the through passenger travel may be shaken up, so to speak, and provoked into patronizing St. Louis institutions. The idea of being a way station is repugnant to these people, and the former notion that a big union station is a convenience and a credit to a city is apparently out of date. They would leave that to be taken up by the next generation, the grandchildren of those who first held it. By that time the pendulum will have swung the other way. But the Saint Louisans at the same time desire to be careful about interfering with through travel

any more than it will bear, and it is suggested that a belt railroad would be the proper thing; a transfer which would not be quite inconvenient enough to alienate the passengers' good feeling. But the ideal scheme, and one which we recommend for trial by cities thus disposed, is an elastic line, a junction railroad made in the form of an expansion ring which can be adjusted according to the demands of trade. When the hotel registers show slim lists and the store clerks have to kill time, just let out the track and unfold its coils so that a trip over it will take an hour or two; then when business becomes satisfactory, shorten the distance, put red pepper in the time-table, and let a reasonable number of passengers go on unvexed.

The owners of elevators at Indianapolis complain that the Western lines do not aid them in securing business. On Jan. 22, eleven car-loads of wheat which had been standing on a side track since last August were brought to that city and placed in one of the elevators, the party owning the wheat having held the cars these five months awaiting better prices. This very road is greatly troubled to secure cars to handle its business, and, says a local paper, "if the general superintendent had not been apprised of the circumstance, the general freight agent would doubtless have allowed them to remain there out of use for weeks longer." Another practice is to hold cars on side tracks to load them by piecemeal, the buyer of grain putting in a few bushels as he purchases it, and sometimes requiring weeks to gather enough to fill the car. Elevator men feel that the roads should take enough interest in their prosperity to stop this unprofitable method of doing business. No great amount of philanthropy or public spirit can be discovered in this wail of the elevator men, but at the same time it must be conceded that their view is in accordance with sound sense. The facts here related are only another evidence that progress toward a millennial state is as slow with railroad men as with other people. As long as there are speculators who will sell dry goods at less than cost, there will be traffic men who will give away the use of cars as storehouses; and even longer, for the value of dry goods can never fluctuate as does that of a freight car.

There are three details of railroad equipment which cause, either directly or indirectly, a considerable percentage of all the losses of life and property. These details are the car stove, the handbrake and the link coupler. If these devices were absolutely necessary, and railroads were compelled to use them under the conditions of operation, then the public would be as patient in waiting for better devices, as they now are with the grade crossings, broken axles and broken rails. But such is not the case. We have steam heating at a less cost to replace the car stove, the automatic air brake to supplant the hand brake on freight trains, and the automatic coupler, in its present form, is so far superior to the link coupler, that no objection of any moment can be offered to its use. The operation of the substitutes, for the three above mentioned inefficient devices, is quite equal to the demands upon them, and there seems to be no reason why the traveling public and the employés of the roads should not be benefited by the adoption of these substitutes or their equivalents, with little or no opposition.

Several theatrical managers, interviewed at Chicago, complain at the operation of the Inter-state Commerce law, which has led the railroads to demand from them prices more nearly equal to single trip rates than before. One man pays the railroads $15,000 annually, and another estimates the total fares paid by all theatrical companies at many hundred times that amount. One says he is benefited by the killing off of smaller traveling companies. Another says:

"I know an excursion party which went from Boston to Albany, thence from New York, and from New York back to Boston, for $5 a head. The best rate I could get over the same ground at another time was $15, and in my company there were 65 people."

This manager apparently forgets that the $5 excursion went at a time selected by the railroads and with little baggage, while his people selected their own time. He mentions, later, that he has 10,000 lbs. of baggage.

Estimates are invited for the construction of an electrical installation not far from Chicago, to furnish power to a flour mill, to be built near the railroad station. The source of power is a waterfall about 4 miles from the railroad. This flour mill is located in the midst of a wheat country, and if satisfactory electrical transmission of power can be arranged a large mill will be built immediately. If, however, such transmission of power cannot be obtained, it is doubtful if any further progress will be made, because the cost of cartage of the wheat to the mill and the flour away from the mill is too great. Much of the wheat is brought in from the surrounding country by farmers, yet a considerable portion of it comes from adjacent stations on the line of the railroad.

The China Railway Company has got orders to push its line to a point within 12 miles of Peking. This extension will be 60 miles in length. The rail will be 70-lb. Sandberg section, laid on Japanese chestnut ties. This will be called the Tungchow extension, that being the proposed terminus on the Pei Ho River near Peking. An extension is also in progress eastward to the city of Kaiping, five miles, and the company hopes to go to Shan Hai Kwan, 80 miles east. Now that the government has consented to let the railroad approach so near to the capital the company thinks there is a good prospect that further extensions will soon be granted.

We were in error in saying that the dividend rate of the New York, New Haven & Hartford was limited by its charter. Our thanks are due to the *Hartford Courant* for this correction.

TECHNICAL.

Locomotive Building.

The Boston & Maine has received a number of heavy freight locomotives from the Manchester Locomotive Works, of Manchester, N. H.

The Connecticut River road has received a switching and a freight engine from the Schenectady Locomotive Works, Schenectady, N. Y.

The Mason Machine Works of Taunton, Mass., have a contract for building a number of narrow-gauge locomotives for the Boston, Revere Beach & Lynn, and will soon commence work on them. The engines will be of the Fairlie pattern.

The St. Louis, Vandalia & Terre Haute will soon have built six heavy freight locomotives to replace the same number of light engines.

The Marietta & North Georgia has received three passenger locomotives, and three Moguls are building at the Baldwin works for spring delivery.

Car Notes.

The New York, Chicago & St. Louis (Nickel Plate) is asking bids for 1,000 freight cars.

The Mexican National has let a contract for building 500 freight cars to the St. Charles Car Co.

The Toledo, St. Louis & Kansas City is asking bids for building 1,000 freight cars.

The Cincinnati, Indianapolis, St. Louis & Chicago has received from the Lafayette Car Works, at Lafayette, Ind., 292 freight cars, which are to be operated under lease from the Keystone Car Trust Co.

The Cincinnati, Hamilton & Dayton has made a contract with the Litchfield Car & Machine Works for building 200 box cars of 50,000 lbs. capacity. We erroneously reported this contract let to the Indianapolis Car & Manufacturing Co.

The Lime Rock road, of Maine, has purchased 135 new rock cars, a portion of which have been received; the remainder are under contract to be delivered during the month of February.

The Wabash has leased 250 box cars for six months at a rental of $10 a month. Half of the cars are to be leased from the Peninsular Car Co., of Detroit, and the other half from the Haskell & Barker Car Co., of Michigan City, Ind.

Bridge Notes.

The Common Council of Philadelphia, Pa., has passed a bill authorizing the construction of a bridge over the Chestnut Hill Branch of the Philadelphia & Reading Railroad at Willow avenue.

The iron work of the suspension bridge at Niagara Falls, N. Y., which was blown down Jan. 10, is now being replaced, and it is expected to have the bridge fully restored by May 15. It is stated that the work will cost $60,000.

The Edge Moor Bridge Works, of Wilmington, Del., has received a contract to build an iron bridge at Lynchburg, Va., for the Richmond & Danville.

The Commissioners of Etowah County ask bids for building an iron bridge near Atalla, Ala.

Hamilton County, Tenn., has authorized an issue of bonds for $200,000 for the construction of a bridge across the Tennessee River at Market street, Chattanooga.

A five-span iron bridge has just been completed by the Shenandoah Valley road over the Shenandoah River at Riverton, Va.

The city of Roanoke, Va., proposes to construct three bridges over the Norfolk & Western tracks, at an estimated cost of $36,000.

The St. Louis & San Francisco has let a contract to the Chicago Forge & Bolt Co. for building a number of bridges. The contract will require about 1,200 tons of material.

The Board of Magistrates of Crittenden Co., Ky., have decided to build an iron bridge, 175 ft. long, over Big Piney River, at Marion, Ky., and bids are now being received.

The Portland & East Portland Bridge Co. has been incorporated in Oregon, with John D. Crozier, Aloys Harold and J. A. Allmireas incorporators. The capital stock is $200,000.

The Dominion Bridge Co., L'd, of Montreal, has contracted with the Canada Atlantic for building the steel superstructure of its bridge over the St. Lawrence River, at Coteau, P. Q. The metal work will be about 3,900 ft. long, with one 145-ft. and two 180-ft. fixed spans, and a 355-ft. swing span over the north channel, ten 215-ft. spans over the middle channel and four 223-ft. spans over the south channel. The bridge will be 16 ft. clear width between trusses and will have four lines of rolled track stringers, and is to be completed by Dec. 1, 1889.

Manufacturing and Business.

The Boston & Albany has recently placed an order with the Betts Fencing Co., of Palmer, Mass., for 15 miles of the wire and picket fence manufactured by this company. Last year the road ordered 15 miles, and after trial increased it to 20.

The Springfield Car & Foundry Co., of Springfield, Mo., has been incorporated, with a paidup capital stock of $50 000. The company is to erect immediately machine, foundry and car shops, and will manufacture freight cars, car wheels and various kinds of castings for railroads.

The Carolina Oil & Creosote Co., of Wilmington, N. C., is to put in four creosoting cylinders, and also to put in 16 new oil retorts, making 32 oil retorts in the works.

The Wyckoff Creosoting Co., of Williamsport, Pa., has works for creosoting lumber, railroad ties, poles, bridge and wharf timber, etc., with dead oil of coal tar. The company has already done work for the Manhattan Elevated, West Shore, and other railroads, and also for electrical companies.

The Receivers of the Missouri, Kansas & Texas have awarded to Proctor & Elliott, of Boonville, Mo., the contract for furnishing ties for one year to the road.

The contract to build a shop building and transfer table at Birmingham for the Alabama Great Southern has been let to Adams & Schneider, of Chattanooga, Tenn. The contract price is about $20,000.

Levering & Garrigues, of Philadelphia, Pa., have contracted to reconstruct four transfer tables at Norfolk, Va., from single to double track.

Ruffner, Dunn & Co., of Philadelphia, Pa., have recently filled orders for 10,000 Excelsior nut locks for the New York, New Haven & Hartford; 60,000 for the Savannah, Florida & Western, and 10,000 for the Central of Georgia.

The Georgetown Barge, Dock, Elevator & Railway Co. will receive proposals until Feb. 20 for the materials and construction of 3,700 ft. of single track road in Georgetown, D. C. Proposals will also be received for constructing the road, the company to furnish materials. John A. Baker, Pacific Bldg., Washington, D. C., is President.

The Stark Car Brake Co., of Toledo, has been incorporated, with $10,000 capital. The object of the company is to manufacture the patent brake invented by J. W. Stark.

The Knoxville Car Wheel Co., of Knoxville, is very busy completing orders. Among some recent machinery which it has built is a nine-ton hammer for the Brunswick & Western road, and two 650-ton hammers for a Cincinnati concern. The company now employs about 125 skilled mechanics, and it will soon be necessary to increase the force.

The contract for 80,000 ties, to complete the first 35 miles of the Monterey & Tampico, has been let to Lutcher & Moore, of Orange, Tex.

The Lake Construction Co., of Chicago, has been chartered with a capital stock of $250,000, to construct railroads, bridges, canals and piers. The incorporators are: J. C. McShane, W. W. Mendenhall and W. D. Rose.

The trains on the Lookout Mountain road, up Lookout Mountain from Chattanooga, are equipped with the Eames Automatic Vacuum Brake.

The Clayton Air Compressor Works, of 43 Dey street, New York, report a large trade in the line of machinery which they manufacture. They have been taxing their works in Brooklyn to the utmost capacity for the past seven months, and they are thinking of making extensions to their facilities. They have built numbers of air compressors for export, besides doing an extensive trade in the Pennsylvania coal regions and the Western mining fields in air compressors to supplant steam in running machines underground, or which from necessity must be situated some distance from the boilers Besides this they have been doing a large trade in a small vertical high pressure belt air pump, largely used in connection with the burning of crude oil and petroleum, for fuel, and by experimenters generally. A catalogue of the air compressors and other machinery manufactured by them will be mailed free on application.

Iron and Steel.

After two weeks of activity, following a former suspension, the Fishback Rolling Mills of the Pottsville Iron & Steel Co., at Pottsville, Pa., employing 600 men, again suspended operations last week. The suspension is compelled by lack of orders, and is indefinite, though a resumption next month is hoped for.

Sealed proposals will be received by James Fulton, Paymaster-General of the United States Navy, until Feb. 26, for the following machine tools: two slotting machines, two horizontal boring and milling machines, one gear cutter, three horizontal boring and drilling machines, two lathes, one universal milling machine, one plain milling machine, five boring and turning mills, one planing machine. Blank proposals, with specifications and description of the several tools, can be obtained upon application to the General Storekeeper at Navy Yard, Washington.

The Passaic Rolling Mill Co., of Paterson, N. J., has decided to erect two new 20 ton open-hearth steel furnaces at a cost of about $100,000.

J. Ogden Hoffman, of 333 Walnut street, has been appointed Philadelphia agent for Carnegie, Phipps & Co., Limited, and Carnegie Bros. & Co., Limited, Pittsburgh, Pa.

The Lewis Foundry & Machine Co. has a contract for a new rolling mill to be located at Rome, Ga. The same company has just shipped to Anderson, Ind., the machinery for a Garret rod mill.

Phillips, Nimick & Co., of the Sligo Iron Works, of Pittsburgh, are about to erect an additional puddle train, which will add much to the capacity in the matter of puddle bars.

The Troy Steel & Iron Co., Troy, N. Y., has started blast furnace No. 1, and will make foundry iron instead of Bessemer steel, as heretofore. This is a new departure, as the furnaces have never been used to make foundry and mill iron.

The Valley Iron Works, of Coatesville, Pa., has given the contract for a large new iron mill.

Two new double furnaces are being added to the puddling department of the Lochiel Iron & Steel Co., at Logan, Pa.

The Secretary of War has awarded to the Midvale Steel Co, of Philadelphia, the contract for furnishing forgings for the 12-in. type gun at 40 cents a pound.

The Bellaire Nail Works, of Bellaire, Ohio, are running by the direct process. Instead of running the material from blast furnace into pig beds, it is taken direct to the Bessemer converters in ladles.

The St. Louis Ore & Steel Co. this week resumed work at the furnaces in Carondelet, Mo.

The Rail Market.

Steel Rails.—No new large sales are reported, either in the East or the South, and the market continues unsettled and dull, with quotations nominally at $27@$27.50.

Old Rails.—A sale of 1,000 tons of tees at Jersey City has been made at $23.50, and a lot of 1,000 tons is offered at $24 afloat for Baltimore. Quotations are $23@$23.50 for tees at New York.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Atlanta & West Point, 3 per cent., payable Jan. 10.

Canadian Pacific, semi-annual, 3 per cent., payable Feb. 18.

Chicago & West Michigan, semi-annual, 1 per cent., payable Feb. 15.

Connecticut & Passumpsic, 2½ per cent. on the preferred stock, payable Feb. 1.

Maine Central, 3 per cent., payable Feb. 15.

Marquette, Houghton & Ontonagon, semi-annual, 3 per cent., on the preferred stock, payable Feb. 15.

Massawippi, 2½ per cent., payable Feb. 1.

New York, Providence & Boston, quarterly, 2½ per cent., payable Feb. 11.

Pemigewassett, 3 per cent., payable Feb. 1.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atchison, Topeka & Santa Fe, annual meeting, Topeka, Kan., May 9.

Chicago, St. Louis & New Orleans, annual meeting, Memphis, Tenn., March 29.

Cumberland Railway & Coal Co., annual meeting, Montreal, Can., Feb. 13.

Delaware, Lackawanna & Western, annual meeting, 26 Exchange Place, New York, Feb. 19.

Guelph Junction, annual meeting, Guelph, Ont., Feb. 12.

Huntingburg, Tell City & Cannelton, annual meeting, Cannelton, O., Feb. 14.

Kingston & Pembroke, annual meeting, Kingston, Ont., Feb. 13.

Illinois Central, annual meeting, 78 Michigan avenue, Chicago, Ill., March 13.

Lincoln Park & Charlotte, special meeting, 36 Wall street,

New York City, Feb. 13, to consider whether $350,000 bonds shall be issued and whether the road shall be leased to the Buffalo, Rochester & Pittsburgh.

Mississippi & Tennessee River, annual meeting, Memphis, Tenn., March 29.

Missouri Pacific, annual meeting, St. Louis, Mo., March 12.

New Orleans & Northeastern, annual meeting, New Orleans, La., March 4.

New York, Susquehanna & Western, annual meeting, Jersey City, N. J., Feb 28.

Philadelphia & Erie. annual meeting, 233 South Fourth Street, Philadelphia, Feb. 11.

St. Louis, Iron Mountain & Southern, annual meeting, St Louis, Mo., March 12.

Summit Branch, annual meeting, Philadelphia, Feb. 12.

Texas & Pacific, annual meeting, 195 Broadway, New York, March 6.

Western Counties, annual meeting, Yarmouth, Nova Scotia, Feb. 13.

Railroad and Technical Conventions.

Meetings and conventions of railroad associatio nsand technical societies will be held as follows:

The *American Institute of Mining Engineers* will hold its nineteenth annual meeting in New York city, Feb. 19. The hotel headquarters will be at the Union Square Hotel.

The *National Association of Railway Surgeons* holds its annual convention in St Louis, Mo., May 2, 1889.

The *New England Railroad Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tifft House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street New York.

The *Boston Society of Civil Engineers* holds its reglar meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Gerard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7.30 p. m. at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7.30 p m. on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

Conference of Railroad Commissioners.

Following is the full text of the circular sent by Secretary Edward A. Moseley, of the Inter-state Commerce Commission, to the Railroad Commissioners of the several states:

"The State Railroad Commissions, with gratifying unanimity, have heartily approved the suggestion for a general meeting, and many who desire to attend have indicated the first week in March as the most convenient time; you are therefore invited to participate in a general conference of Railroad Commissioners, to be held at the office of the Interstate Commerce Commission, No. 1317 F street, in the city of Washington, at 11 o'clock A.M., on the 5th day of March, 1889.

"Among the subjects which may be properly considered are the following:

"*Railway Statistics*, with especial reference to the formulation of a uniform system of reporting.

"*Classification of Freight*, its simplification and unification.

"*Railway Legislation*, how to obtain harmony in.

"*Railway Construction*, should regulation be provided?

"And such other topics affecting state and inter-state commerce as may be brought forward by members of the Conference, the above suggestions not being designed to exclude the consideration of any other subject of common interest. An opportunity will also be afforded for consultation in respect to the heating and lighting of cars, automatic car-coupling, continuous train-brakes, and other matters now more particularly within the sphere of state authority. Brief papers are invited from members of the Conference upon any topic deemed of importance. Arrangements will be made for preserving a permanent record of the proceedings."

New England Railroad Club.

The regular monthly meeting of the club will be held on Wednesday, Feb. 13, at 7:30 p. m. The subject for discussion is Steam Couplings for Passenger Cars.

The Northwest Railroad Club.

A regular meeting of the Northwest Railroad Club was held in the directors' room of the St. Paul Union Depot on Tuesday, Feb. 5, at 7:30 p. m. The subject for discussion was "Flangers," introduced by Mr. W. T. Reed, of the Chicago, St. Paul & Kansas City road.

PERSONAL.

—Mr. Charles Pontez, who was for over 20 years Chemist of the Union Pacific, died at Omaha, Neb., Jan. 24.

—Mr. Bennett H. Young, at the recent annual meeting of the Kentucky & Indiana Bridge Co., tendered his resignation as President and Director.

—Chairman G. R. Blanchard, of the Central Traffic Association, has withdrawn his resignation and will continue to fill the office of Chairman as heretofore.

—Mr. Charles H. Jones, Jr., has resigned his position as secretary of the South Baltimore Car Works, to become the General Manager of the Suffolk & Carolina road.

—Mr. Walter D Gregory, recently chemist of the New York, Lake Erie & Western, has accepted a position with Messrs. Charles H. Gillespie & Sons, varnish manufacturers, New York.

—Mr. William Voss, Assistant Master Mechanic of the Burlington, Cedar Rapids & Northern, has accepted the position of Assistant Engineer of the Fox Solid Pressed Steel Co., with headquarters in Chicago.

—Col. I. M. Gibson, Land Commissioner of the Little Rock & Fort Smith, owing to his private business demanding so much of his time and attention, has tendered his resignation as Commissioner. Col. Gibson has held this position for six years.

—William J. Latta, General Agent of the Pennsylvania in Philadelphia, has been appointed Superintendent of the Junction road, the corporation controlling the connection between the Philadelphia, Wilmington & Baltimore, the Pennsylvania, and the Philadelphia & Reading roads.

—Mr. Job Abbott, President Dominion Bridge Co. (Limited) and Chief Engineer of the Wheeling Railway Bridge & Terminal Co., of Wheeling, West Va., has opened an office at 150 Broadway, N. Y. He will be at his office in Wheeling from the 2d to the 5th, and at his Montreal office (Windsor Hotel) from the 14th to the 17th of each month

ELECTIONS AND APPOINTMENTS.

Allegheny & Kinzua.—The officers of this company are as follows: S. S. Bullis, President; M. P. Dunbar, Secretary; J. E. Rooney, Treasurer and Auditor; P. McNeil, General Freight and Passenger Agent; C. D. Williams, Superintendent. The Superintendent's headquarters are at Bradford, Pa., and the general offices at Olean, N. Y.

Atlantic Coast Line.—J. R. Nolan has been appointed Assistant Superintendent of Transportion of the Wilmington, Charleston & Columbia Divisions of this road, with headquarters at Wilmington, N. C. E. Borden has been appointed Chief Train Dispatcher and Chief Operator of the same divisions, with headquarters at Wilmington, N. C.

Atlantic & Pacific.—J. W. Robins has been appointed Car Accountant of the Western Division of this company, with headquarters at General Superintendent's office, Albuquerque, New Mexico.

Baltimore & Ohio.—George Kimball has been appointed Chief Dispatcher and Chief Division Operator, with office in Newark, O., to succeed C. E. Barnes.

Canadian Pacific.—James Wilson having accepted the position of Claims Agent, the following appointments have been made: Thomas Tait, Superintendent Ontario Division; T. Williams, Assistant Superintendent Ontario & Quebec Section; J. W. Leonard, Assistant Superintendent Credit Valley Section, all with offices at Toronto. The Ontario & Quebec Section will include the Toronto, Grey & Bruce, Teeswater Branch, and the line east from Toronto Junction to Montreal Junction. The Credit Valley Section will include the line west to St. Thomas, the London, Guelph, Orangeville & Elora branches, also Toronto Junction, Parkdale, Queen's Wharf and Union stations.

Cape Girardeau Southwestern.—Edward F. Blomeyer has been appointed Assistant Superintendent of this road, and in addition to his duties as Assistant Superintendent will have special charge of the movement of trains and the passenger and freight department. The position of Master of Transportation and Trains has been abolished.

Chicago, Freeport & Sioux City.—The incorporators of this Illinois company are: Thomas S. Moffatt, of Chicago; A. L. Brink, of Warren, Ill; C. E. Brink, of Fremont, Neb.; Charles Squires, of Chicago, and H. J. Brink, of Remsen, Iowa.

Chicago, Milwaukee & St. Paul.—The position of Freight Traffic Manager has been created and A. C. Bird, General Freight Agent, has been appointed to fill the new office. George S. Marsh, General Passenger and Ticket Agent of the Milwaukee, Lake Shore & Western, has been appointed Assistant General Passenger and Ticket Agent of this road, to succeed George H. Heafford, who has been appointed First Assistant General Passenger Agent.

Creston & Southeastern.—The following are the directors of this Iowa company: J. A. Raids, William Grounds, D. H. Broks, S. A. Brewster, L. A. Heinly, A. B. Devoe, J. B. Harsh, C. S. Rex and A. P. Stephens. The principal office is at Creston, Iowa.

Cumberland Valley & Martinsburg.—The following officers were elected at the recent annual meeting: President, Thomas B. Kennedy; Secretary, M. T. Inglis; Treasurer, W. L. Ritchey; Chief Engineer, Chauncey Ives; Directors, Thomas B. Kennedy, John Stewart, J. F. Boyd, Chauncey Ives, A. L. Langdon, E. Boyd Faulkner, A. I. Thomas, William T. Stewart and George M. Owers.

Danville, Chicago & Western.—The following officers have been elected: President, Gen. John McNulta; Vice-President, M. A. McDonald, of the Cairo, Vincennes & Chicago; Treasurer, K. H. Wade; Secretary, Hiram Beckwith; Chief Engineer, Charles Hanson, of Chicago.

Dayton & Lebanon.—The incorporators are William Huffmann, G. B. Harman, G. W. Houck, H. T. Mead, W. P. Callihan, and H. E. Talbott. The general offices are at Dayton, O.

Denver, Texas & Gulf—At a recent meeting of the stockholders in Denver, the following were elected directors: Morgan Jones, J T. Granger, F. A. Keener, William Barth, George Tritch, Job A. Cooper, C. B. Kountze, J. S. Brown and John Evans.

Des Moines & Northwestern.—H. D. Thompson has been elected Treasurer, vice J. S. Polk, resigned.

Duluth & Iron Range.—S. T. Pope has been appointed Superintendent, vice W. H. Brimson, resigned, with office at Two Harbors, Minn.

Erie & Huron.—E. H. Edwards is now the Accountant of this company, in place of William Mardon.

Escanaba, Twin City & Western—At a recent meeting of the stockholders F. W. Day, of Milwaukee, was chosen Treasurer, to succeed the late Lieut.-Gov. McDonald.

Eureka Springs.—F. M. Richardson has been appointed General Passenger Agent of this company, vice A. H. Foote, resigned.

Florida Ry. & Navigation Co.—W. N. Thompson has been appointed Treasurer, with office at Jacksonville, Fla., vice J. H. Thomas, deceased.

Green Ridge.—The officers of this Maryland company are as follows: F. Mertens, President; William M Mertens, Treasurer; John H. Mertens, Manager. The office is located at No. 52 South Centre street, Cumberland, Md.

Gulf, Colorado & Santa Fé.—E. Leloup having resigned, R. B. Gemmell has been appointed Superintendent of Telegraph, with office at Topeka, Kan.

Huntington & Broad Top Mountain.—At the annual meeting of the road held this week, the following directors were elected: President, B. Andrews Knight; Directors, R. Wilson, John Devereaux, I. V. Williamson, James Long, James Whitaker, Thomas R. Patton, Jacob Naylor, Spencer M. Janney, William J. Barr, M. E. McDowell, William Cochran, John B. Watson.

Illinois Central.—The title of the Northern Division has been changed to Amboy Division; that of the Middle Division to Pontiac Division. The Chicago, Madison & Northern road is now called the Wisconsin Division of the Illinois Central.

Kansas City, Wyandotte & Northwestern.—At the recent annual meeting in Kansas City, Mo., the following directors were chosen: W. D. Bethel, O. H. P. Piper, John K. Speed, Samuel Tate, Jr., H. M. Neeley, J. R. Goodwin, W. P. Dunnavant, Memphis; K. B. Armour, Newman Erb, E. Summerfield, Kansas City; V. J. Lane, Kansas City, Kan.; A. B. Stickney, St. Paul, and C. W. Blair, Leavenworth. The directors elected W. D. Bethel, President; K. B. Armour, Vice-President; Newman Erb, Vice-President and General Manager; C. H. Trimball, Secretary, and E. Summerfield, Assistant Secretary and Treasurer.

Kentucky & Indiana Bridge Co.—At the annual meeting held in Louisville, Ky., Jan. 30, the following board of directors was chosen: Julius Bamberger, J. W. Gaulbert, E. T. Halsey, Thaddeus W. Spindle, J. M. Fetter, Thomas W. Bullitt, W. H. Thomas, J. F. Gebhart, W. T. Grant, Philip B. Bate, John E. Green, St. John Boyle, of Louisville, Ky., and W. S. Culbertson, of New Albany, Ind.

Keokuk & Western.—J. F. Elder has been appointed Auditor, Assistant Treasurer and Paymaster, with office at Keokuk, Ia., vice Joseph Bennett resigned.

Lake Erie, Essex & Detroit River.—The officers of this road are as follows: E. C. Walker, Manager and Treasurer; G. W. Bush, Superintendent of Traffic; C. F. Hanson, Superintendent of Work. The offices are located at Walkerville, Ont.

Lincoln Park & Charlotte.—The officers of this company are as follows: A. Iselin, Jr., President, 36 Wall street, New York; William A. Baldwin, Vice-President, Rochester, N. Y.; John F. Dinkey, Auditor and Assistant Treasurer, Rochester; John H. Hocart, Secretary and Treasurer, 36 Wall street, New York; William E. Hoyt, Chief Engineer, Rochester.

Louisville & Nashville.—B. H. Hopkins has been appointed Traveling Passenger Agent, in charge of all Florida territory, with office in Jacksonville, Fla.

Macon, Tuscaloosa & Birmingham.—The officers of the company are: President, R. C. Patty, of Macon, Miss.; Chief Engineer, H. P. Farrar, Jackson, Tenn.; Secretary, Thomas J. O'Neil, of Macon.

Manistee & Northeastern.—The officers of this company are as follows: Edward Buckley, President and General Manager; C. F. Ruggles, Vice-President; W. J. Law, Secretary and Treasurer; William Douglas, General Superintendent. General offices are at Manistee, Mich.

Massillon & Cleveland.—At the annual meeting held in Massillon, Ohio, Feb. 5, the following directors were elected: Louis H. Meyer, Charles W. Cass, J. N. McCullough, John J. Haley, John Sherman, P. G. Albright, M. A. Hanna. Officers were elected as follows: L. H. Meyer, President, and John J. Haley, Secretary and Treasurer.

Minneapolis, St. Paul & Southwestern.—The following officers have been elected: President, C. C. Garland, of Minneapolis; Vice-President, Thomas Bahen, of Waseca, Minn.; Secretary, C. M. Smith, of Minneapolis; Treasurer, B. Warner Miller, of Minneapolis; Chief Engineer, F. D. Woodbury, of Waseca.

Mobile & Ohio.—G. W. King has been appointed Acting General Passenger Agent, vice J. L. G. Charlton, resigned. S. Hopkins has been appointed General Traveling Agent, with headquarters at St. Louis, Mo., in place of T. J. Whitehead, General Agent, resigned. F. E. Chapman, having resigned to accept service with another road, the general agency at Chicago, Ill., has been abolished.

Montpelier & Chicago.—The following are the officers of the company: David Stauffer, President; A. H. Baldwin, Vice-President; Jacob Lew, Treasurer; George Strayer, Secretary, all of Montpelier, Ind.

Montpelier & White River.—The following directors have been elected: J. G. Smith, E. C. Smith, J. R. Langdon, John Lynde, M. Martin, Marcus Pick, L. F. Aldrich. The directors elected L. F. Aldrich President and George T. Childs, Clerk.

Newburg, Dutchess & Columbia.—The following directors were elected at the annual meeting of the company in Newburg, N. Y., Feb. 1: John S. Schultze, L. B. Ward, William S. Eno, William N. Sayres, R. G. Coffin, Potter Billings, Albert E. Mans, C. L. Kimball, R. C. Van Wyck, N. T. Plass, Samuel I Wright, H. B. Willetts, William Lummis. Gen. J. S. Schultze was chosen President and Treasurer, W. A. Wells, Secretary, and C. L. Kimball, Superintendent.

New Haven & Derby.—H. C. Cogswell has been appointed General Freight Agent, and A. W. Perrin, General Passenger Agent of this road, with offices at Bridgeport, Conn.

New York, Philadelphia & Norfolk.—At the recent annual meeting the following directors were elected: A. J. Cassatt, W. L. Scott, W. A. Patton, J. G. Cassatt, U. H. Painter, C. A. Griscom, R. H. Townsend, Jr.

The following officers were chosen: President, A. J. Cassatt; Vice-President, William A. Patton; Treasurer, J. G. Cassatt; Secretary, William Cariss.

Norfolk & Virginia Beach.—Warner Van Norden is now Vice-President, in place of W. J. Welsh, and Wm. Evans, Jr., is Secretary and Treasurer, in place of L. W. Rowland.

Northwest & Florida.—The following are the officers of this company, formerly the Montgomery & Florida: Nathan T. Sprague, President, Brooklyn, N. Y.; Joseph W. Dimmick, Vice-President; R. Pushmore, Secretary, Brooklyn, N. Y.; David A. Brady, Treasurer, Brooklyn, N. Y.; B. Dunham, General Superintendent; S. L. Woodford, General Counsel, Brooklyn, N. Y. The general offices are at Montgomery, Ala.

Oneonta & Richfield Springs.—The directors of this New York company are: Rufus P. Luce, Elisha Robinson, Zina Doolittle, Chester L. Harrington, Hiram S. Bradley, Hopkins J. Burlingham, Eunford Aldrich, George McAuger, of Hartwick; Albert C. Couch, Charles E. Newham, Franklin I. Couch, William C. Culver, of New York, and J. A. Westervelt, Jersey City, N. J. The officers are: President, A. C. Couch; Treasurer, R. P. Luce; Secretary, H. J. Bradley.

Pasadena.—The officers of this California company are: J. P. Woodbury, President; A. B. Manahan, General Manager; R. M. Furlong, Auditor; P. M. Green, Treasurer. General offices are at Pasadena, Cal.

Piedmont Air Line.—The office of James H. Drake, General Freight Agent, has been removed from Washington, D. C., to Richmond, Va.

Pittsburgh & Western.—W. L. Cromlish, formerly Assistant General Freight Agent, has been appointed General Freight Agent, with office at Allegheny.

Providence & Worcester.—The old board of directors was re-elected at the annual meeting held in Providence, Feb. 4.

Puget Sound Shore.—I. A. Nadeau is now manager of this company, in place of T. J. Milner.

Quebec & Maine.—The incorporators of this new Maine company are: Hon. Frank Jones of Portsmouth, N. H., a director of the Boston & Maine; Hon. Arthur Sewall of Bath, President of the Maine Central; John Ayer of Oakland, President of the Somerset; Hon. E. F. Webb of Waterville; Frank W. Hill of Bangor and A. W. Hall of Sherbrooke, P. Q.

Richfield & Clearfield.—The Ridgeway & Clearfield and the Susquehannah & Clearfield, two leased lines of the Pennsylvania, held their annual elections in Philadelphia this week, the following directors being elected by each company: President, J. N. Dubarry; Directors, John P. Green, Amos R. Little, Wistar Morris, G. B. Roberts, N. Parker Shortridge and Henry D. Welsh.

Richmond & Danville.—J. A. Lockard, Master of Trains of the Charlotte division, has been granted a leave of absence on account of ill health, and A. Ramseur has been appointed Acting Master of Trains.

St. Augustine & South Beach.—The officers of this company are M. S. Carter, President; Allen Wood, General Manager, and A. L. Knowlton, Chief Engineer. The general office is at St. Augustine.

St. Louis, Arkansas & Texas.—W. B. Dodridge, General Manager of the company, has been elected a director, to fill the vacancy caused by the resignation of B. B. Wilkens, of Pine Bluffs, Ark.

St. Paul, Minneapolis & Manitoba.—H. C. Ives has been appointed Superintendent of the Breckenridge Division, in place of J. A. Mayer, transferred. J. A. Mayer has been made Superintendent of the Montana Division, with headquarters at Great Falls, Mont. R. W. Bryan has been made Superintendent of the Northern Division, in place of A. Guthrie.

Schuyler & Lehigh.—The full list of the officers of the new company is as follows: President, E. N. Frisby, of New York; Vice-President, M. E. Worthen, of New York; Treasurer, James A. Thurston, Treasurer of the American Loan & Trust Co., of New York; Directors, M. E. Worthen, A. B. Cornell, R. W. Bissel, of New York; Gen. James S. Negley, Pittsburgh, Pa., N. N. Betz, Towanda, Pa.; J. W. Moyer and John H. Williams, Pottsville; J Raymond Claghorn, Philadelphia.

Scranton & Forest City.—This Pennsylvania company has elected the following officers: E. B. Sturgis, President; John Fleming, of New York, Treasurer; C. R. Pitcher, Scranton, Assistant Treasurer; E. A. Dean, of Scranton, Secretary.

Seattle & Southern.—The organization of the company has been effected by the election of the following officers: Thomas Ewing, of San Francisco, President; L. S. Hunt, Vice-President; M. S. Bates, Secretary; J. P. Hoyt, of Seattle, Treasurer; Gen. Charles Caldwalader, Consulting Engineer.

Sharon.—The annual meeting was held in Sharon, Pa., Jan. 22, and the following officers and directors were elected: President, E. A. Wheeler, Sharon; Secretary, John H. Dynes, Cleveland; Treasurer, Charles Hall, Sharon; Directors, Norman Hall, P. L. Kimberly, J. J. Spearman and Simon Perkins, Sharpsville; Earl Tupper and Fayette Brown, of Cleveland.

Sheffield Terminal.—At the recent annual meeting, held at Sheffield, Ala., the following directors were elected: Col. Enoch Ensley, Martin Ensley, Henry Habbeler, P. Campbell, Alfred Parrish, Edward Doud and Thomas D. Radcliffe. The officers chosen are: President, Col. Enoch Ensley; Secretary and Treasurer, Thomas D. Radcliffe; Superintendent, P. Campbell.

Short Route Transfer.—At the postponed annual meeting held at Louisville, Ky., Feb. 2, the following directors and officers were elected: C. P. Huntington and I. E. Gates, of New York; Hon. Henry D. McHenry, of Hartford; and Charles R. Long, W. R. Ray, James Gilbert, W. W. Smith, Thomas W. Bullitt, of Louisville; C. P. Huntington, President; Charles R. Long, Vice-President; J. W. Baird, of Louisville, Secretary and Treasurer. The charter of the company, as amended by the last Legislature, was discussed and the stockholders agreed not to accept it as it at present stands.

Sinslaw & Western.—The incorporators of this Oregon company are: A. G. Hovey, J. A. Straight, Wm. A. Cox, J. M. Hodson and E. C. Smith. The principal office will be in Lane County, Or.

Stockton, Fresno & Southern.—The following comprise the board of directors: Henry L. Davis, President; A. S. Murray, Vice-President; Thomas R. Hayes, H. B. Hunt, L. M. Hickman, Geo. H Collins and Daniel E. Hayes, all of San Francisco, Cal. The Secretary of the company is A. T. Eggleston, of San Francisco, and the general office is at 212 Sansome street.

Stony Creek.—The annual meeting was held in Norristown, Pa., Jan. 21, and directors and officers were elected as follows: President, James Boyd; Secretary and Treasurer, Howard Boyd; Directors, A. R. Cox, F. D. Sower, O. G. Morris, D. S. Heebner, Samuel Dresher, John Slingluff, Daniel C. Getty, E. Channing Potts, J. P. Hale Jenkins, John S. Heebner, John Oberholtzer and William F. Slingluff.

Syracuse & Baldwinsville.—The titles of the officers of this road are now as follows: F. C Hollins, President; John T. Skinner, Vice-President; D. M. Henderson, Secretary and Treasurer; F. F. Bentley, Receiver and General Manager.

Toledo, Ann Arbor & North Michigan.—A. J. Paisley has been appointed General Passenger and Ticket Agent, with office at Toledo, O. W. H. Bennett, who has heretofore had charge of this department, will hereafter perform the duties of General Freight Agent only.

Tuckerton.—Homer N. Gilson has been appointed Superintendent, in place of Joseph J. Pharo, resigned. Mr. Gilson will remain General Freight and Passenger Agent.

Union Pacific.—J. M. Barr, recently Superintendent of the Chicago, Burlington & Northern, has been appointed Superintendent of the Wyoming Division, with office in Cheyenne, to succeed G. M. Cumming, who has been made Assistant General Manager of the line west of Cheyenne.

Wabash.—M. B. Williams, Commercial Agent at Council Bluffs, Ia., has been appointed Commercial Agent at St. Louis to succeed E. O. Hutchins.

Wheeling & Lake Erie.—The annual meeting of the road was held in Toledo. O., Feb. 5, and the following Board of Directors elected: George J. Forrest, New York; S. C. Reynods, George W. Davis and M. D. Woodford, Toledo; John G. Warwick, Massillon; James M. Ham and M. Van Rensselaer, Jr., New York. The last two named succeed D. E. Garrison and Melville C. Day.

Worcester, Nashua & Rochester.—The annual meeting of stockholders of the road was held at Worcester, Mass., Jan. 30. The old board of directors was re-elected as follows: Charles A. Sinclair and Frank Jones of Portsmouth, N. H.; John A. Spaulding, Frank A. McKean and Charles Holden of Nashua, N. H.; E. B. Stoddard, Worcester; George C. Lord, Newton; James P. Cook, Salem; George W. Armstrong, Brookline. Charles A. Sinclair was re-elected President, T. W. Hammond, Treasurer.

Wyoming, Salt Lake & California.—The officers of this company are: James E. Fulton, President and Treasurer; Chester Howe, Vice-President, and Theodore Brough, Secretary; all of Salt Lake City, Utah.

OLD AND NEW ROADS.

New Companies Organized.—Chicago, Freeport & Sioux City.—Creston & South Eastern.—Dayton & Lebanon.—Oneonta & Richfield Springs.—Quebec & Maine.—Sinslaw & Western.

Alabama Great Southern.—The contract for building the shops of the company at Birmingham, Ala., has been awarded to the Chattanooga Construction Co., of Chattanooga, Tenn., and work will begin at once. The building will be 91 × 260 ft., and will be located in the rear of the company's machine shops.

Allentown Terminal.—It is stated that Nolan Bros., of Reading, have received the contract for the building of the line into Allentown, Pa., and will soon begin work. The Allentown Terminal Co. represents the roads entering Allentown, and its object is to furnish all of them proper entrance into the city. The right of way has all been secured.

Atlanta, Asheville & Baltimore.—This company has been organized to build a road from Atlanta, Ga., to Asheville, N. C., and thence to Roanoke, Va. The towns along the proposed route in North Carolina will be asked to subscribe between $500,000 and $1,000,000 in county bonds. The company is trying to make arrangements for organizing a construction company. N. Atkinson, of Asheville, N. C., is President.

Atlantic & Danville.—Baily, Eliason & Co. have contracted to grade 12 miles of the road from Clarksville, Va., eastward, and they will commence work at once.

Baltimore & Drum Point.—A force of 700 men is reported at work on this road between Baltimore and Drum Point, Md. About 35 miles of the road has already been graded, and the contracts for the entire line have been let, except for the Washington branch, and eight miles of the main line. A. Albert, of Baltimore, is President.

Baltimore & Ohio.—President Cleveland has approved the act authorizing the use of certain streets and avenues in the District of Columbia by the road to meet the demands of increased travel incident to the inauguration of President Harrison.

Boston & Albany.—The company has applied to the Massachusetts legislature for leave to increase its capital stock from $20,000,000 to $30,000,000. Samuel Hoar, counsel for the road, in appearing before the railroad committee of the Legislature to support the petition, explained it as follows:

"The increase includes several million dollars already authorized, and is needed to meet the payment of $7,000,000 bonds which mature soon—$5,000,000 due Feb. 1, 1892, and $2,000,000 due July 1, 1895—and to pay for certain extensive betterments which must be made before long. The bonds are bearing 6 and 7 per cent. interest, and the road wishes to pay its debts as they become due, rather than to refund the debt, this appearing to be the safer way for a conservative corporation to proceed. The rest of the $10,000,000 asked for is needed for improvements."

As stated in the annual report, all expensive betterments along the entire line, including costly extensions and new stations, have for some years been paid for from the current expense account, and nothing has been charged to the construction account for a long time. This policy has been pursued just as far as possible, and the road must have more money very soon. Among the contingencies more or less remote are reckoned the separation of all railroad and highway grade-crossings throughout the length of the main line and branches, and the purchase of all the innumerable private ways crossing the tracks. The crossings are public nuisances, and the railroad will be as glad to see them abolished as the community can possibly be. The private ways are a menace chiefly to the railroad, and must be brought up as reasonably as may be. The desire to straighten the road at several points, notably between Riverside and Wellesley and along the shore of Lake Quinsigamond, is of long standing, and is desirable in order to make possible a safe 50-minute trip between Boston and Worcester. The extension of the four track system is another pressing need. The four tracks now extend from Boston to Riverside, 11 miles, and it is thought desirable to extend them westward to South Framingham as soon as practicable. This would make a stretch of 21 miles of as fine four-track road as can be found on earth, with turfed banks, neat fences and all the artistic environments which the leading railroads are introducing to court patronage and make travel inviting and pleasurable. There are several costly jobs in prospect, such as the proposed changes at the stations in Newton and Westfield, where stopping trains obstruct the principal thoroughfares, and one, that at Springfield, is now under way." Mr. Hoar also referred to the abolishing of the "know-nothing" crossing of the Boston & Providence. While this question is an old one and may not be speedily settled, the Boston & Albany people would be glad to see a solution near at hand, and a new station at Exeter street is, therefore, among the possibilities of the next few years.

Bowling Green & Northern.—Warren County, Ky., will on March 2 vote on the matter of giving $150,000 to this proposed road from Bowling Green, Ky., to a point on the Ohio River, at or near Owensboro, Ky.

Canada & St. Louis.—The auditor of the J. J. Burns Co. (Limited), which failed a few days ago, gives the following assets and liabilities from the inventory and schedule of the railroad company: Assets, stocks, $1,085,000; notes and subscriptions, $45,000; material, $24,000; real estate, $1,800; total, $1,185,800. Liabilities: Joliet Steel Co., $281,120; John Fitzgerald; $188,000; E. C. Nichols, $86,911; John Paton & Co., $30,000; Car Trust obligations, $115,000; sundry claims, $82,000; right-of-way claims, $38,000; total, $821,031.

Central Pacific.—The suit of the United States against Henry Curtner and others has been decided at San Francisco by Judge Sawyer in favor of the complainant, Justice Field concurring. This is the case in which the Government took up the controversy of the Central Pacific, and sought to recover from some thirty and odd defendants 2,867 acres in Livermore Valley, in California, which had originally been part of the land granted to the Central Pacific, but which, between the years 1871 and 1873, were transferred by the Commissioner of the General Land Office to the state of California, from which it had passed to the defendants. The railroad for a number of years had applied to the Secretary of the Interior for a ruling in its favor, which it finally got, and in 1884 Attorney-General Brewster began this suit in the Circuit Court.

Chattanooga, Rome & Columbus.—The extension south to Columbus, Ga., from the present southern terminus at Carrolton, is now being surveyed by S. Z. Ruff.

Chicago & Atlantic.—Counsel are engaged before Judge Gresham settling the terms of the decree foreclosing the first and second mortgage aggregating $11,500,000 on the road. The objectors to the decree are the second-mortgage bondholders, who will appeal to the Supreme Court of the United States. The road has no floating debt, and its business seems to be increasing.

Chicago & Eastern Illinois.—The company has applied to the New York Stock Exchange to list $1,465,000 additional preferred stock, and $2,197,800 additional common stock. This action is preparatory to a practical consolidation with the Chicago & Indiana Coal, the new issue representing the stock of that road, and the exchange of stocks is to be made share for share. Hereafter there will be practically but one stock, but it is understood that the formal organization of the Chicago & Indiana Coal will be continued, enough shares being held outside to qualify directors. The union of these two roads confirms the control by the Chicago & Eastern Illinois of one of the most important entrances into Chicago, and the ownership of coal fields at Brazil, Ind. The two roads have been connected, and the Chicago & Eastern Illinois has been double-tracked from Momence Junction to Chicago. The company not only controls the track into Chicago, but owns large tracks of adjoining property in the city. It holds a fifth interest in the Chicago & Western Indiana.

Chicago, Freeport & Sioux City.—This company has filed a charter in Illinois to construct a road from Freeport, westerly to Galena, about 45 miles. A branch is also proposed from a point on the Apple River, in Joe Daviess County, north to the Wisconsin state line. The capital stock is placed at $1,500,000, and the principal office is to be in Chicago.

Cornwall & Lebanon.—Another survey for the proposed extension east from Lebanon to Reading, Pa., has been completed, and the directors are said to have adopted this last survey as the route upon which to build. The line is almost parallel to the Philadelphia & Reading. The proposed route, after leaving Reading, where it connects with the Pennsylvania, runs to the north of the Lebanon Valley branch of the Reading, passing through the towns that are reached by the latter. Among the towns reached will be Sinking Spring, Wernersville, Womelsdorf, Robesonia, Stouchburg and Myerstown.

Coudersport, Hornellsville & Lackawanna.—This company has completed surveys from Coudersport, Pa., via Colesburgh and Genesee Forks, Pa., and Greenwood, N. Y., to Hornellsville, a distance of 55 miles. The line in New York is called the Hornellsville, Coudersport & Lackawanna. W. H. Wickham, of Hornellsville, N. Y., is Chief Engineer, and D. C. Larrabee, of Coudersport, is President.

Creston & Southeastern.—This company has filed a charter in Iowa to build a road from Creston southeast to Van Wert, about 40 miles. It will connect at Van Wert with the Keokuk & Western, and with the Chicago, Burlington & Quincy at both points.

Cumberland Valley.—Work on the extension of this road from Martinsburg, W. Va., to Winchester, Va., 22 miles, has been continued during the winter, and about 15 miles of road has now been graded.

Danville, Chicago & Northwestern.—Charles Hansel, of the Wabash, has been chosen Chief Engineer of this road, and he will immediately commence a survey from Danville to Strawn, Ill., on the Wabash, a distance of about 61 miles. The line would give the Cairo, Vincennes & Chicago a direct outlet from its northern terminus to Chicago and the Northwest, and would tap important coal fields as well as running through a good country. It will also do a good local business.

Dayton & Lebanon.—A company has been organized at Dayton, O., to build a line from Dayton to Lebanon, O., by a route not yet decided upon. The capital stock is $500,000, and surveys will be made shortly.

Denison & Washita Valley.—The company has let a contract to D. B. Corder and one to Ramey, Dodson & Sturman for grading the first section of the road. W. B Munson will have charge of construction work, with office at Denison, Tex.

Duluth & Winnipeg.—The company has applied for permission to increase its capital stock from $5,000,000 to $8,700,000, to build its line from Duluth to the boundary line near the Lake of the Woods. The Duluth terminal facilities, it is estimated, will cost $2,000,000.

Elgin, Joliet & Eastern.—The company has filed in Illinois a copy of a mortgage, covering all its rights, franchises, equipment, real estate, buildings and other improvements, for the sum of $6,000,000, and made in favor of the Union Trust Co., of New York, and John M. Butler, of Indianapolis. The amount thus realized is to be used to complete unfinished portions of the line.

Elk Mountain.—This road is now surveyed and finally located from Carbondale, Col., to Robinson's Lake, and it is intended to begin active work on it this coming spring. During the winter months the company is developing its large anthracite coal fields, for the marketing of the product of which, mainly, the road is to be built. O. Metcalf, of Colorado Springs, is President.

Empire & Dublin.—This road now extends from Empire, Ga., on the East Tennessee, Virginia & Georgia, east toward Dublin, a distance of 11 miles. It is standard gauge, with 56 lb. rail, and is operated by the Empire Lumber Co., of Chattanooga, Tenn. Early in March work will be commenced on extending the line east 19 miles to Dublin, and west from Empire, 12 miles, to Hawkinsville. This will make a line 42 miles long, from Dublin to Hawkinsville; the former

place is at the head of navigation on the Oconee River and the latter of the Ocmulgee River. The extensions will be built under a special charter, and will be open for general traffic this year.

Escanaba, Twin City & Western.—Meetings are being held along the route of this proposed road, and the various towns will be asked to vote subscriptions. The line, as proposed, is to start from Escanaba, Mich., and extend southerly to Antigo, Merrill, Medinord and Chippewa Falls. From this point it will penetrate Southern Minnesota and Northern Iowa, with a line to Minneapolis & St. Paul.

Evansville & Richmond.—The road has been surveyed from Elnora to Seymour, Ind., and the preliminary survey from the latter place northeasterly was last week commenced by Chief Engineer C. S. Slayback, of Evansville, Ind.

Fitchburg.—The Board of Referees, consisting of Geo. Shattuck and R. S. Hopkins, to whom was left the matter of establishing the liability for the Somerville Bleachery fire of 1884, which was said to have been caused by a spark from a locomotive, have decided against the road. The road is liable for the damages, which, it is reported, may exceed $250,000.

Flint & Pere Marquette.—At the stockholders' meeting in East Saginaw, Mich., Jan. 30, the following roads were formally consolidated under the above name: Flint & Pere Marquette, East Saginaw & St. Clair, Saginaw & Mount Pleasant, Saginaw & Clare County, and the Manistee. Details of the consolidation have already been given in these columns.

Henderson State Line.—Warren County, Ky., will on March 2 vote on the question of subscribing $200,000 to the capital stock of this proposed road.

Houston & Texas Central.—Mr. Charles Dillingham, Master Commissioner, gives notice that the first mortgage main line bonds and first mortgage Western Division bonds of the company and coupons will be paid on Feb. 11 out of the proceeds of the foreclosure sale at the office of the Central Trust Co., and that all interest will cease. Holders of the non-assented main line and Western Division first mortgage bonds and coupons of the company desiring to collect the same before Feb. 11, may, upon presentation thereof to Central Trust Co., receive the amount at once, with interest to date of payment.

Illinois Central.—The new line from Chicago to Madison, Wis., via Freeport, Ill., is now in active operation from Clyde, six miles west of Chicago, to Madison. The company's Western and Northwestern trains at present run from Clyde into Chicago over the Stock-Yards tracks and the tracks of the Chicago, St. Louis & Pittsburgh and Wisconsin Central, but the company expects to complete the unfinished section of the new road between Chicago and Clyde shortly, the right of way through Cicero and the city having been obtained. It will cross the canal near Thirty-fourth street. At Thirty-first street it crosses the South Branch of the Chicago River and the Chicago & Alton tracks, using the Alton's bridges at that point jointly with that company. It then runs parallel with the Alton on Archer avenue to Grove street and on Grove street to Sixteenth street, where it meets the St. Charles Air Line east of the bridge over the river at that point. It then runs on the St. Charles Air Line (near Sixteenth street) to its tracks on the Lake front and thence to the Central Depot.

Jacksonville, St. Augustine & Halifax.—There has been recorded in the County Clerk's office, at Jacksonville, Fla., a mortgage for $1,000,000, given by the company to the Mercantile Trust Co., of New York.

Kansas City & Independence Rapid Transit.—This company has been chartered in Missouri by Daniel B. Holmes, J. V. C. Karnes and others, to build a road 11 miles long from Kansas City to Independence.

Kentucky & Indiana Bridge Co.—At a recent annual meeting, held in Louisville, the stockholders decided to issue $600,000 second mortgage bonds to better the condition of the property generally.

Kentucky Midland.—Tracklaying is in progress at both ends of this road, from Frankfort and Georgetown, Ky. The contractors expect to complete the road at least two months before the specified time.

Lincoln Park & Charlotte.—This road is to extend from a point on the Buffalo, Rochester & Pittsburgh, near Lincoln Park Station, N. Y., some two miles from Rochester, to a connection with the Rome, Watertown & Ogdensburgh, at Charlotte, on Lake Ontario. The surveys have been made, and much of the right of way is secured. Contracts for building the line will be let within the next six weeks. William E. Hoyt, of Rochester, is Chief Engineer.

Louisville & Nashville.—The company has made a proposition to the citizens of Butler County, Ky., to extend its Mud River branch from Mud River mines to Morgantown, Ky., a distance of 12 miles, if they will donate the right of way and build a depot at that place. It is probable the proposition will be accepted.

Louisville, St. Louis & Texas.—The company is now running its trains over the whole road from Louisville to Henderson, Ky., making a boat transfer at Spottsville, Ky., where the recent bridge accident occurred.

Luverne Andalusia & Pensacola.—Books have been opened in Andalusia, Ala., for subscriptions to the capital stock of the company, which is placed at $200,000; it is expected that it will soon be all subscribed. The road is projected to extend from Luverne, Ala., via Andalusia, to Pensacola, Fla., 125 miles, and it is expected to commence surveys in May, and to let contracts for building the line in July. Right of way has not yet been secured, but it is expected that this will be donated. The line will require but little grading and few bridges. Cyrus A. O'Neal is President and S. J. S. Cawthorn, of Andalusia, is Secretary.

Lynchburg & Durham.—The stockholders of the company have authorized an issue of bonds, secured by a mortgage on the road, and they have been placed in Philadelphia. The proceeds of the bonds are to be used in completing the line from Lynchburg, Va., to Durham, N. C., 110 miles.

Macon, Tuscaloosa & Birmingham.—This road is now surveyed from Macon, Miss., to Tuscaloosa, Ala., 66 miles, and the right of way for 50 miles has been secured. It is proposed to build the road to Birmingham, 120 miles from Macon. Bridges will be required across the Tombigbee River near Fairfield and the Black Warrior River near Foster's Ferry.

Mexican Pacific.—J. C. Oliphant, Chief Engineer, is now making the final location from Tonala, in the state of Chiapas, on the Pacific Coast, to Mal Paso. It is thought that by next March grading will be begun at Tonala. W. T. Pritchard is the representative of the company in the city of Mexico.

Missouri Pacific.—The company has opened for business the new branch from Fort Smith to Greenwood, Ark., a distance of 18 miles.

Monterey & Mexican Gulf.—The grading on this Mexican road has been completed for a distance of nearly 40 miles south of Monterey, and tracklaying will be begun about Feb. 20.

Montpelier & Chicago.—This company has been organized to build a road from Steubenville, Ind., to Montpelier, Ind., and thence northwestwardly.

New Roads.—The following companies who have not adopted a title are applying to Parliament for acts of incorporation: Application is made by a company for power to build a line commencing at Edmundston, New Brunswick, thence following the easterly side of the St. John River to the parish of Perth, thence crossing the St. John River and to Florenceville. Also for power to build a branch line from Grand Falls to connect with the Intercolonial and Caraquet roads at Bathurst. A company seeks power to construct a line from Cobourg, Ont., to some point on the river Trent, and from thence to some point on the Canadian Pacific, thence to Madoc, Ont. Another company wants power to construct a line from Moose Jaw, Northwest Territories, in a northerly direction, via Battleford to Edmundton, thence to the Peace River country, with power to build a branch line to Prince Albert.

It is stated that J. H. Burckhalter, F. F. Lockhart and J. E. Hogan will build a road from Outland, on the Central of Georgia, via Statesburg to Excelsior, Ga., 30 miles.

New York, Lake Erie & Western.—A mortgage for $2,800,000 on the Jefferson branch of the road to the Fidelity Co., of Philadelphia, is being filed. Of this money $2,000,000 is to be spent in paying the interest on bonds of the company due Jan. 1, and the other $800,000 is to be used to pay for the recent double tracking of the road.

Northern Pacific & Manitoba.—The Canadian Pacific on Jan. 31 filed a bill in chancery at Winnipeg, Man., asking the courts to restrain the Northern Pacific & Manitoba from continuing construction in the province on the ground that the local legislature cannot enact legislation regarding railroads connecting at the boundary line.

Old Colony.—The company has applied to the Massachusetts legislature for leave to increase its capital stock from $12,000,000 to $15,000,000. President Choate in presenting the petition said that the policy of the road had been eminently judicious and the capitalization has been kept at the lowest point advisable. Of late years the business has increased so largely and steadily that existing facilities are inadequate. Seventy-five miles of double track must be built for the present urgent requirements of the road, at an estimated cost of $1,000,000. A short line to the Cape, from Plymouth to Sandwich, has been determined upon of high convenience to travel and traffic. A new steamer is required to replace the burned Bristol, and new car shops are to be provided, to cost, with the land for them, $200,000. An important item is the expense of the abolition of grade crossings, an improvement of such value and importance that the public are directly interested in pressing its completion at the earliest day feasible. If there is any margin over the projected improvements it can be advantageously applied to the retiring of high-rate bonds.

Oneonta & Richfield Springs.—Incorporated in New York to build a road from a point on the Delaware, Lackawenna & Western, in or near the village of Richfield Springs to the village of Oneonta, or to a point on the Delaware & Hudson road, near Oneonta, distance 32 miles. Branches are also to be built to Morris and Ganetsville. The capital stock is fixed at $320,000. It is estimated that it will cost $670,000 to build the road.

Oregon Railway & Navigation Co.—The company has now received permission from the Secretary of the Interior to build across the Cœur d'Alene Indian Reservation, in Idaho. The company obtained the consent of the Indians to cross the reservation early last summer, but the Department of the Interior decided that the amount of the remuneration to be paid the Indians should be definitely fixed before final consent could be given. This was obtained, and the permission to begin work was then granted. The road is now completed from Farmington, northwesterly to Rockford, W. T., near the western line of the reservation. The line from Rockford to Mullan, Idaho, will be about 60 miles long, and there will be considerable heavy work. The contract has already been let to J. H. Smith, of Portland, Or., and to Corey Bros., of Ogden, Utah. The bridge will be built by Hoffman & Bates, of Portland.

It is stated that W. T. Watson, locating engineer, has staked out a line from Mullan, Idaho, 125 miles east across the Cœur d'Alene country in Idaho, to Missoula, Mont. If built the line would require two tunnels, one 6,800 ft. long, through the Cœur d'Alene Mountains, and the other through the Bitter Root Mountains.

Owensboro', Falls of Rough & Green River.—Ground was broken on this new Kentucky road at Owensboro', Ky., last week, and the grading is making good progress.

Pacific Short Line.—It is stated that $400,000 has been raised in subscriptions along the route of this road, which it is proposed to build from Sioux City, Ia., to Ogden, Utah, and that a contract has been let to Donald McLain, of Salt Lake City.

Quebec & Maine.—This company is applying to the Maine Legislature for a charter to build a road from a point on the Quebec Central, at or near the northwest boundary of the state, southeast about 50 miles, to The Forks, in Somerset County. The Forks is about 20 miles north of Bingham, the proposed northern terminus of the Somerset road, and it is intended to build a line connecting the two roads.

Red River, Sabine & Western.—The contract for grading this road from San Augustine, Tex., southeasterly toward the Sabine River, about 32 miles, is reported let to the Fort Worth Construction Co. Grading is to commence immediately. L. L. W. Lloyd, of San Augustine, is President.

Salt Lake, Nevada & California.—Work on the eastern division of the road will commence at Salt Lake City as soon as the condition of the ground (which is now frozen) will permit it to be worked to advantage. It is claimed that ample means have been secured to meet the demands of the construction company for the portion of the road that will be constructed this coming summer. The principal sources of revenue for the eastern division until the whole line is completed will be the transportation of cattle and sheep and ores. It will open one of the largest ore-producing districts and stock ranges west of the Rocky Mountains. The principal passenger traffic will be in connection with the bathing resorts of Great Salt Lake. The company proposes to construct a road from Salt Lake City to a point on the Pacific Coast in the state of California, but it at present declines to make public the point of the western terminus. Under the same general control with this enterprise is the Wyoming, Salt Lake & California, which has been surveyed and located from Salt Lake City to a point on the boundary line between Wyoming and Utah territories. It is the purpose of the company to build this road and equip it by Nov. 1, 1889. Contracts will be let March 10. The object of this road is to open coal fields, of which the projectors control nearly 3,000 acres.

Theodore Brough, of Salt Lake City, is Secretary of both companies

San Antonio & Aransas Pass.—The extension to Houston, Tex., has been completed with the exception of a gap of 10 miles between the Brazos River and the city. Track has been laid for three miles east of the Brazos River, and from Houston track has been laid west to within ten miles of the line. The work of construction has been somewhat retarded by the recent heavy rains, but it is now being renewed with increased vigor. The rise in the Brazos River is interfering to some extent with the progress of the work on the bridge, but it is believed that it will be ready for service almost as soon as the track is completed.

San Diego & Del Mar.—It is reported that the franchise and right of way of the San Diego & Ocean road has been transferred to this company. This road is to be completed from San Diego to Del Mar, Cal., within six months. Rolling stock has been purchased.

Saskatchewan.—Application has been made to Parliament for an act to incorporate this company for the purpose of constructing a line of railroad from Dunmore Station, on the line of the Canadian Pacific, thence in a northerly direction to a crossing at the South Saskatchewan River at Drowning Ford, thence across the Red Deer River, near its mouth, to Saskatoon, and in a northeasterly direction to Fort La Corne, and a junction with the Hudson's Bay road at a point on Nelson River.

Savannah, Americus & Montgomery.—The directors of the Americus, Preston & Lumpkin Road at a recent meeting accepted the charter recently granted by the Georgia Legislature, changing its corporate name to "The Savannah, Americus & Montgomery Railway." They also decided to use new heavy equipment in widening the present gauge; to build east from Abbeville, Ga., to a connection with the East Tennessee, Virginia & Georgia, a distance of about 25 miles; also to issue 30-year 6 per cent. bonds at the rate of $12,000 per mile on its present completed road and on such extensions as may be made.

Seattle & Southern.—At a recent meeting of the directors held in Seattle, Wash. Ter., it was decided to at once commence the locating survey for the line from West Seattle to Portland, Ore., 170 miles. R. H. Stretch will be Engineer in Charge. When the survey has been completed and the route definitely determined upon for some distance from Seattle, the contracts will be let and the work on the roadbed will be pushed. Preliminary surveys have already been made.

Siuslaw & Western.—The company has filed a charter in Oregon to build a road from Siuslaw Bay, via Eugene, to the eastern state line of Oregon. The capital stock is placed at $1,000,000.

South Bethlehem & Utica.—This company is to build a road from Wemple's station, on the Albany branch of the West Shore, to Utica, N. Y., via Bethlehem, Schoharie, Central Bridge and Sloansville. Of this line nearly 20 miles have been surveyed, with a maximum grade of 68 ft. per mile. W. A. Slingerland, of Albany, N. Y., is Chief Engineer.

South Carolina.—Proceedings were begun on Feb. 2, in the United States Court, at Charleston, S. C., for a foreclosure of the first mortgage on the road, which defaulted on the interest on its second mortgage bonds on Jan. 1. The petitioner is H. P. Walker, one of the trustees under the first mortgage. The Court decided that the motion could not be considered on the day it was presented, and it will have to go over to May 6.

Stockton, Fresno & Southern.—This road is to start from tide-water at Stockton, Cal., and run down the east side of the San Joaquin Valley, through the stock and grain producing counties of San Joaquin, Stanislaus and Merced, and entering Fresno County, famous for its fruits, wines and raisins as well as its livestock, timber and mines, crosses the flume of the Madera Flume & Trading Co., a few miles east of Madera. After crossing the San Joaquin River, the line enters the thriving city of Fresno, which, though only 15 years old, has a population of 20,000 inhabitants, and a freight output during the year 1888 of 27,000 tons. From this point the road runs to Centerville, the terminus of the Moore & Smith Lumber Flume, which taps the largest belt of pine and redwood timber yet opened in California. Here also it crosses the road that the citizens of Fresno propose to build to the mining, timber and granite districts, about 20 miles east of their city. Continuing on down the valley the line runs through vineyards, orchards, small farms, extensive grain fields and stock ranges, until it reaches its terminus at Visalia, Cal. The line is 175 miles long, and runs its whole length through the largest and most productive valley on the Pacific Coast, dotted with town and cities, and having a producing capacity that the owners of the road believe assures them a dividend paying business from the time the first train passes over the road. The output of lumber alone is 100,000,000 ft. annually, all of which, it is claimed, will go over this road. At points where the line approaches the Southern Pacific, the people are giving rights of way and raising subsidies for the erection of attractive depot buildings, while the larger shippers are said to be willing to contract to send all their freight over this line for a term of years. As we have already stated, there are 12 bridges along the line, the contracts for which have been placed with the American Bridge Co., of San Francisco. The final surveys are about completed, rights of way secured, and grading will probably commence immediately. Trains will be running over a portion of the road by September of this year.

The articles of incorporation were filed in California, Aug. 11. The names and addresses of officers are given in another column.

Toledo, Columbus & Southern.—The suit of the American Finance Co. and the Central Trust Co. to set aside the sale of the road made last October was decided in the United States Court at Toledo, O., Feb. 4. Judge Jackson confirmed the sale, and the Receiver was directed to turn the property over to the purchasers. Notice of an appeal to the United States Supreme Court was given.

Toledo & Ohio Central.—At a recent meeting of the stockholders it was voted to increase the common stock $257,000 for the purpose of taking up some income bonds of the Ohio Central Company.

Union (Canada).—This company is seeking an act of incorporation for the purpose of constructing a line of rail road from Pembroke, Ont., to Renfrew, and to connect at Portage-du-Fort with and amalgamate with the Portage-du Fort & Bristol Branch road; also for power to connect with the Pontiac Pacific Junction road at Quio and at Aylmer,

with the Canadian Pacific; also to connect with the Kingston & Pembroke near Renfrew.

Vicksburg & Meridian.—The road was sold at Jackson, Miss., Feb. 4, by Major F. S. Bond, Special Commissioner, under the foreclosure decree rendered by the United States Circuit Court in favor of the Farmers' Loan & Trust Co., of New York. The whole property and franchises brought about $590,000, the purchasers being Charles Schiff, Edward Colston, W. L Nugent, J. F. Winslow and W. S. Jarvis. This road is part of the Queen and Crescent system and runs from Vicksburg to Meridian, Miss., 140 miles.

Wabash.—A report has just been filed in the United States Circuit Court at Chicago by Bluford Wilson and A. J. Ricks as masters in the foreclosure proceedings against the Wabash finding in favor of the Johnson-Popper committee of dissenting bondholders, upon all the points in controversy. These points are: First, the validity of the extension of the Toledo & Illinois, and the Lake Erie, Wabash & St. Louis. The masters find that this extension was duly and regularly made. Second, the funded debt and scrip of 1877. The masters find that this debt, both bonds and scrip, is a part of the first mortgage upon the various lines to which the original bonds belonged, and is entitled to be treated precisely as the original first mortgage debt. Third, the question of the equipment and rolling stock of the Wabash system. The masters find that all the present equipment of the system belongs primarily to its first mortgage bondholders, and must be appropriated among the several first mortgages on some equitable basis. In the absence of testimony supporting any other method of division, they report that it should be divided on the basis of mileage. The proceedings before the masters were going on for over three months, and were closed on Jan. 10, since which time the masters have been preparing the report.

Western Maryland.—The graders on the extension of the Baltimore & Harrisburg, from Ortenpa, Pa., to Blue Ridge, on Jan. 5, began to excavate for a cut and a tunnel to run under the tracks of the Northern Central and across a portion of ground lately bought by the Northern Central a short distance north of York, Pa. As fast as the excavations to mark the line of the road was made, men in the employ of the Northern Central refilled the trench, and placed on top of it rows of ties on which were spiked rails. An injunction was secured to prevent the Northern Central from interfering with the work, and the next day the work was proceeded with by this company, without molestation from the Northern Central. The injunction was later withdrawn.

Winona & Southwestern.—Chief Engineer C. M. Wheeler has just completed a survey from Osage to Nora Springs, Ia., and states that the cost of building the road to that point would be from $100,000 to $170,000 cheaper than to build to Mason City, Ia., both about an equal distance.

TRAFFIC AND EARNINGS.

Traffic Notes.

A new grain elevator with 20 bins, capable of holding 100,000 bushels of grain, has been built at Hartford, Conn. It is on land adjoining the tracks of both the principal railroads.

The Express companies have agreed upon a restoration of rates between the East and the West, which have been very low. The advance is to the basis of tariffs existing prior to May 1, 1886, and went into effect Feb. 4.

The freight agents at Suspension Bridge, N. Y., have to give bonds for the duty on freight originating in Canada and passing through the United States for export to Europe, South America, etc. These bonds have been issued for a period of 60 days, and in case of delay in receiving the evidence that the freight had passed out of the United States, have been extended. The Assistant Secretary of the Treasury has now refused to grant extensions as liberally as heretofore, and the agents are much disturbed.

The Missouri Railroad Commissioners have issued a decision to the effect that the car-load rates for live stock prescribed by the laws of that state apply to mixed lots of different kinds of stock, and that 30 ft. cars are contemplated by the act. The minimum weight specified, 24,000 lbs., is to be used for cars of that length, and for longer or shorter cars the minimum must be proportionately raised or lowered.

The Chairman of the Missouri Board of Railroad Commissioners has requested the Inter-state Commerce Commission to go to Jefferson City to investigate the complaints of shippers against the railroads concerning live stock shipments, the new rates by the 100 lbs. having caused much dissatisfaction.

It is stated that the Kansas Railroad Commissioners have issued a decision ordering the old car-load rates on live stock to be restored.

The new agreement of the Western States Passenger Association went into effect Feb. 1. All the roads that are parties to it will be required to file with Chairman Abbott, by Feb. 10, a complete and sworn statement of the number of tickets outstanding at the time the agreement became effective in order that the situation may be clearly understood and the necessary steps taken to clear the market of these disturbing tickets. The Wabash, which had declined to sign, except with the understanding that a restoration of the fast trains between Chicago and Kansas City by its competitors should be regarded as equivalent to a cut in rates, was persuaded to withdraw this proviso and leave the time question to be settled by the presidents. The agreement is a carefully considered revision of the previous organization, which has been strengthened by the better defining of penalties, territorial lines, etc. The new commission tariff, which is an important feature, reduces the commission to be paid on the sale of tickets to $1 between Chicago and the Missouri River and considerably to other points.

Commissioners Cooley and Morrison have held informal conferences with the State Railroad Commissioners and with railroad men at St. Paul, Minn., and also with railroad officers at Chicago the past week.

Oranges are now being shipped from Florida in bulk, the same as potates or corn. They are piled about 3 ft. high, and paper is run around the sides of the car, while the floor is covered with fine marsh grass.

The Supreme Court of Minnesota has decided the Minneapolis switching charges case, which was appealed from a lower court. The Minneapolis Eastern road declined to put in effect the tariff ($1 per car) ordered by the State Railroad Commissioners. The Chicago, St. Paul, Minneapolis & Omaha was involved in a similar case. The ruling of the court now practically reaffirms the right of commissioners to fix rates. The case will be taken to the United States Supreme Court.

The Chicago, Burlington & Quincy and the Chicago, St. Paul & Kansas City have adopted the Iowa Commissioners' freight tariff, and President Perkins of the former has advised the commissioners that he will refund all overcharges since the rates were published. These rates are about 30 per cent. lower than those heretofore in effect in Iowa and 20 per cent. lower than the Illinois Commissioners' rates. Nearly all the roads have announced their intention of following the example of those above named. The large reduction will inevitably affect rates outside of the state.

There are rumors that grain rates from Chicago to the Atlantic seaboard are being slightly cut. Grain traffic is light and Chicago men claim that an unduly large share of corn from the West is going through junction points south of that city. Considerable corn from Nebraska and Iowa is going down the Mississippi River to New Orleans.

John P. Squire & Co., pork packers, of East Cambridge, Mass., who receeive 175 carloads of hogs weekly from the West over the Boston & Albany, and pay freight bills annually to the amount of $700,000, have complained to the Inter-state Commerce Commission of unjust rates, laving damages at $75,000. Figures are given showing that from Nov. 21 to Dec. 26, 1887, the roads made reduction in rates for transporting cattle, dressed beef and dressed hog products varying from 10 to 52 per cent., but made no reduction for transporting live hogs. From May 14 to Dec. 17, 1888, they made reductions varying from 28 to 70 per cent. on cattle and 38 to 70 per cent. on dressed cattle and hogs, and only reduced the rate on live hogs 16⅔ to 23⅓ per cent.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Feb. 2, amounted to 54,183 tons, against 56,509 tons during the preceding week, a decrease of 2,326 tons, and against 52,065 tons during the corresponding week of 1888, an increase of 2,118 tons. The following are the proportions carried by each road:

	W'k to Jan. 26.		W'k to Feb. 2.	
	Tons.	P. c.	Tons.	P. c.
Wabash	5,495	9.7	6,064	11.2
Michigan Central	4,320	7.6	4,367	8.1
Lake Shore & Mich. So.	5,692	10.0	7,125	13.1
Pittsburgh, Ft. W. & Chicago	6,920	12.2	6,716	12.4
Chicago, St. L. & Pittsburgh	6,516	11.5	6,238	11.5
Baltimore & Ohio	4,791	8.4	3,611	6.7
Chicago & Grand Trunk	10,884	19.4	10,549	19.5
N. Y., Chicago & St. Louis	6,602	11.7	4,507	8.3
Chicago & Atlantic	5,289	9.5	5,006	9.2
Total	56,509	100.0	54,183	100.0

Of the above shipments 4,290 tons were flour, 22,386 tons grain, 2,488 tons millstuff, 3,499 tons cured meats, 3,517 tons lard, 8,101 tons dressed beef, 475 tons flaxseed, 797 tons butter, 1,518 tons hides, 57 tons wool, and 3,612 tons lumber. The three Vanderbilt lines together carried 29 5 per cent. of all the shipments, while the two Pennsylvania lines carried 23.9 per cent.

Coal.

The coal and coke tonnage of the Pennsylvania, originating on lines east of Pittsburgh and Erie, for the week ending Jan. 26, and the year to that date, was as follows:

	Coal.	Coke.	Total.
Total for week ending Jan. 26	210,061	81,200	291,261
Total for year 1889 to date	813,240	353,962	1,167,202
Total for year 1888 to date	912,954	339,637	1,252,591

The tonnage originating on the lines east of Pittsburgh and Erie for the years 1888 and 1887 was as follows:

	Coal.	Coke.	Total.
Total for year 1888	11,617,139	4,154,267	15,776,406
Total for year 1887	10,508,603	3,762,779	14,271,382

The anthracite coal tonnage of the Belvidere division of the United Railroads of New Jersey division for the same periods was as follows:

	1889.	1888.	Dec.
For week ending Jan. 26	27,897	30,866	2,969
For the year to that date	103,807	130,838	27,031

The Cumberland coal trade for the week ending Feb. 2 amounted to 51,985 tons, and for the year to that date 275,619 tons.

Cotton.

The cotton movement for the week ending Feb. 3 is reported as follows, in bales:

	1889.	1888.	Inc. or Dec.	P.c.
Interior markets:				
Receipts	60,939	49,441	I. 11,498	23.3
Shipments	89,343	67,897	I. 21,446	31.6
Stock	361,239	379,556	D. 18,317	4.8
Seaports:				
Receipts	155,354	98,668	I. 56,686	57.4
Exports	96,834	102,385	D. 5,551	5.4
Stock	939,294	942,712	D. 3,418	0.4

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

NEW YORK CENTRAL & HUDSON RIVER.

Three months to Dec. 31:	1888.	1887.	Inc. or Dec.
Gross earnings	$9,170,889	$10,020,226	D. $849,337
Oper. expenses	5,971,640	6,470,511	D. 498,871
P. c. of ex. to earnings	65.11	64.57	
Net earnings	$3,199,249	$3,549,715	D. $350,466
Fixed charges	1,963,260	1,954,860	I. 8,400
Profit, .0138 per cent	$1,235,989	1,594,855	D. 358,866
Dividend	894,283	894,283	
Surplus	$341,706	$700,572	D. $358,866

UNION PACIFIC.

Month of December:			
Gross earnings	$2,380,426	$2,243,871	I. $136,555
Oper. expenses	1,488,990	1,479,648	I. 9,342
Net earnings	$891,436	$764,223	I. $127,313
Year to Dec. 31:			
Gross earnings	$29,260,824	$28,557,766	I. $703,054
Oper. expenses	17,933,945	16,616,761	I. 1,317,184
Net earnings	$11,326,879	$11,941,005	I. $614,126

SOUTHERN PACIFIC—ATLANTIC SYSTEM.

Year to Dec. 31:			
Gross earnings	$11,582,373	$10,313,406	I. $1,268,967
Oper. expenses	8,012,131	7,283,884	I. 728,247
Net earnings	$3,570,242	$3,029,522	I. $540,720

NORTHERN CENTRAL.

Month of December:			
Gross earnings	$499,538	$490,285	I. $9,252
Oper. expenses	209,669	300,474	D. 90,804
Net earnings	$289,868	$189,811	I. $100,057
Year to Dec. 31:			
Gross earnings	$6,203,394	$6,212,926	D. $9,532
Oper. expenses	4,093,573	4,139,441	D. 45,869
Net earnings	$2,109,821	$2,073,484	I. $36,337

WABASH.

Month of November:	1888.	1887.	Inc. or Dec.
Gross earnings	$564,042	$590,850	D. $26,808
Oper. expenses	486,765	472,941	I. 13,824
Net earnings	$77,277	$117,909	D. $40,632
Eleven months—Jan. 1 to Nov. 30:			
Gross earnings	$6,028,169	$6,386,896	D. $358,727
Oper. expenses	4,897,496	4,365,907	I. 531,589
Net earnings	$1,130,673	$2,020,989	D. $890,316

DENVER & RIO GRANDE WESTERN.

Month of December:			
Gross earnings	$120,885	$101,941	I. $18,944
Oper. expenses	78,061	80,139	D. 2,078
Net earnings	$42,823	$21,801	I. $21,022

Month of December:	1888.	1887.	Inc. or Dec.	P.c.
Allegheny Valley	$183,545	$179,048	I. $4,497	2.5
Net	76,167	73,727	I. 2,440	3.3
Camden & Atl. & br.	35,398	33,724	I. 1,674	5.0
Net	def. 1,750	def. 6,314	I. 8,064	....
Canadian Pacific	1,146,441	1,151,741	D. 5,300	.5
Net	418,672	363,707	I. 54,965	15.1
Cape Fear & Yad. Val	28,910	26,537	I. 2,373	9.0
Net	13,916	13,631	I. 285	2.1
Central of N. Jersey	977,212	992,478	D. 15,266	1.5
Net	384,637	423,786	D. 39,149	9.2
Cin., N. O. & Tex. P.	319,497	298,097	I. 21,400	7.2
Net	129,000	95,109	I. 33,891	35.6
N.O. & Northeast'n	111,517	83,635	I. 27,882	33.4
Net	48,000	35,000	I. 13,000	37.2
Vick. & Mer.	73,534	64,341	I. 9,193	14.3
Net	40,000	24,000	I. 16,000	66.7
Vick., Sh. & Pac.	67,315	71,758	D. 4,443	6.2
Net	23,000	37,000	D. 14,000	38.0
Denv. & Rio Gr. W.	120,886	101,942	I. 18,944	18.6
Net	42,824	21,802	I. 21,022	96.4
Louis. & Nashville	1,454,222	1,449,562	I. 4,660	.3
Net	646,147	575,179	I. 70,968	12.3
N. Y., Lake E. & W.	2,141,803	2,232,648	D. 90,845	4.1
Net	684,682	684,230	I. 230	.1
Net due leased lines	485,469	481,517	I. 3,952	.8
N. Y., Ont. & West.	122,062	119,485	I. 2,577	2.2
Net	9,016	6,257	I. 2,759	43.8
Norfolk & Western	409,727	406,428	I. 3,299	.8
Net	146,716	182,059	D. 35,332	19.4
Northern Pacific	1,481,523	1,181,773	I. 299,750	25.4
Net	517,406	472,996	I. 44,410	9.4
Ohio & Mississippi	401,122	345,919	I. 55,203	16.0
Net	142,058	112,614	I. 29,444	26.1
Philadelphia & Erie	257,164	328,637	D. 71,473	21.7
Net	433	87,007	D. 86,574	99.5
Phila. & Reading	1,517,066	1,715,656	D. 198,590	11.6
Net	627,645	793,632	D. 165,987	20.9
P. & R. C. & I. Co.	1,125,563	1,573,422	D. 447,859	28.4
Net	def. 251,920	def. 46,204	D. 2,051	....
Total both co.'s	2,642,629	3,289,078	D. 646,449	19.7
Net	375,725	747,428	D. 371,703	50.1
Pitts. & Western	177,691	172,377	I. 5,314	3.1
Net	52,658	47,336	I. 5,322	11.2
Rome, Wat. & Ogd.	267,368	264,161	I. 3,207	1.2
Net	108,497	107,830	I. 667	.6
West N. Y. & Penn.	248,753	237,131	I. 11,622	5.0
Net	64,162	56,137	D. 8,025	14.3
West Jersey & br.	96,846	98,897	D. 2,051	2.1
Net	1,593	def. 3,968	I. 5,561	.. .
Wisconsin Central	273,270	278,189	D. 4,919	1.9
Net	91,987	.....	.....	....
Month of November:				
Den. & Rio Grande	666,860	750,428	D. 83,568	11.2
Net	224,172	305,504	D. 81,332	26.6
Eliz., Lex. & B. S.	87,232	110,633	D. 23,401	21.2
Net	31,486	48,168	D. 16,682	34.6
Mexican National	229,961	178,410	I. 51,551	28.9
Net	32,620	28,083	I. 4,537	16.1
Southern Pacific Co.:				
North. Div. (Cal.)	155,001	142,765	I. 42,236	29.6
Net	88,890	57,377	I. 31,513	55.0
South. Div. (Cal.)	521,132	465,902	I. 55,230	11.8
Net	138,021	108,421	I. 29,600	27.3
Arizona Division	164,630	169,176	D. 4,546	2.7
Net	def. 7,935	63,501	D. 71,436	....
New Mexico Div.	78,584	59,202	I. 19,382	32.7
Net	36,781	20,484	I. 16,297	79.5
Twelve months—Jan. 1 to Dec. 31:				
Allegheny Valley	2,098,965	2,029,108	I. 69,857	3.4
Net	900,928	797,770	I. 103,151	12.9
Camden & Atl. & br.	696,128	678,644	I. 17,484	2.6
Net	131,493	138,564	D. 7,071	5.1
Canadian Pacific	13,195,535	11,606,413	I. 589,122	13.7
Net	3,870,776	3,504,118	D. 366,658	10.5
Cape Fear & Yad. Val	328,199	276,347	I. 51,852	19.1
Net	153,740	133,795	I. 19,945	14.9
Central of N. J.	13,177,473	11,424,675	I. 1,752,798	15.3
Net	5,973,405	4,998,902	I. 974,503	19.5
Cin., N. O. & Tex. P.	3,624,490	3,377,552	I. 246,938	7.3
Net	1,125,000	1,260,766	D. 135,766	10.8
N. O. & Northeast.	900,341	711,782	I. 188,559	26.5
Net	160,000	136,000	I. 24,000	17.6
Vicks. & Meridian	505,675	558,690	D. 53,015	9.5
Net	111,000	110,000	I. 1,000	9.0
Vick., Shreve. & P.	568,733	608,207	D. 39,474	6.4
Net	133,000	184,000	D. 51,000	27.7
Denv. & Rio Gr. W.	1,366,622	1,181,326	I. 185,296	15.7
Net	396,058	341,968	I. 54,070	15.8
Louisv. & Nashville	16,043,199	16,042,176	I. 1,023	....
Net	5,786,568	6,325,331	D. 538,763	8.5
N. Y., L. E. & W.	27,009,353	26,853,269	I. 156,084	.6
Net	9,200,925	9,106,261	I. 94,664	1.0
Net less due leased lines	6,857,586	6,717,228	I. 140,358	2.1
N. Y., Ont. & West.	1,689,431	1,550,169	I. 139,262	9.0
Net	236,065	264,122	D. 28,057	10.6
Norfolk & Western	4,899,599	4,254,794	I. 644,805	15.1
Net	1,897,672	1,771,014	I. 126,658	71.5
Northern Pacific	18,060,104	13,854,319	I. 4,205,785	30.3
Net	7,046,172	6,046,291	I. 999,881	16.5
Ohio & Mississippi	3,868,984	4,128,365	D. 259,381	6.0
Net	1,117,444	1,436,441	D. 318,997	22.2
Philadelphia & Erie	4,373,042	4,036,931	I. 336,111	8.3
Net	1,639,954	1,579,884	I. 60,070	3.8
Phila. & Reading	20,616,746	21,903,073	D. 1,286,327	5.9
Net	9,724,049	11,310,911	D. 1,586,862	14.0
P. & R. C. & I. Co.	18,375,794	19,656,704	D. 1,280,910	6.5
Net	def. 177,067	1,423,928	D. 1,600.995	....
Total both co.'s	38,992,540	41,559,777	D. 2,567,237	6.2
Net	9,546,982	12,734,837	D. 3,187.855	25.0
Pittsburgh & West.	2,030,454	2,041,863	D. 11,409	.6
Net	509,381	494,487	I. 14,894	3.0
Rome, W. & Ogd.	3,357,353	3,222,607	I. 134,746	4.2
Net	1,439,162	1,438,478	I. 684	....
West. N. Y. & Penn.	3,177,990	2,786,285	I. 391,705	14.1
Net	867,896	572,511	I. 295,385	51.6
West Jersey & brs.	1,556,034	1,469,216	I. 86,818	5.9
Net	501,901	492,957	I. 8,944	18.1
Wisconsin Central	3,808,944	3,723,108	I. 85,836	2.3
Net	.....	.....	.....	.....
Eleven months—Jan. 1 to Nov. 30:				
Den. & Rio Grande	7,053,326	7,269,285	D. 215,959	3.0
Net	2,337,595	3,008,899	D. 671,304	22.3
Eliz., Lex. & B. S.	919,208	1,015,752	D. 96,544	9.5
Net	272,109	378,551	D. 106,442	25.4
Southern Pacific Co.:				
North. Div. (Cal.)	1,931,550	1,590,163	I. 341,387	21.5
Net	890,679	731,182	I. 159,497	21.8
South. Div. (Cal.)	6,122,108	3,892,504	I. 2,229,604	57.0
Net	1,550,980	1,267,790	I. 283,190	22.3
Arizona Div.	1,923,589	1,521,815	I. 401,774	26.4
Net	279,199	604,535	D. 325,336	53.8
New Mexico Div.	916,725	635,799	I. 280,926	44.2
Net	277,003	265,616	I. 11,387	4.3

Early reports of monthly earnings are usually estimated in part, and are subject to correction by later statements.